Vol. XVIII, No. 1 MAY, 1947

THE TOOL ENGINEER

OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS

Sunrise in Dixie . . . . . *by W. B. Peirce*

Drawing Die Problems and Formulae . . . . . *by James Walker*

Application of Geophysical Instruments to Oil Prospecting . *by J. H. Dunaway*

Recent Developments in Crush Grinding Thread and Annular Forms . . . . . *by Carl J. Linxweiler*

Numerical Classification—A Milestone in Standards Progress . . . . . *by John M. Cannon*

New Diamond Die Drilling Method . . . . . *by U. S. Bureau of Standards*

Report on Flexible Molds . . . . . *by Thomas A. Dickinson*

Departments

A.S.T.E. News • Andygrams • Gadgets • Fundamentals of Tool Engineering • Good Reading • Bulletins • Tools of Today • North, East, West, South in Industry • Index to Advertisers

Behind every product that is mass produced is the tool engineer

Competition Ahead!

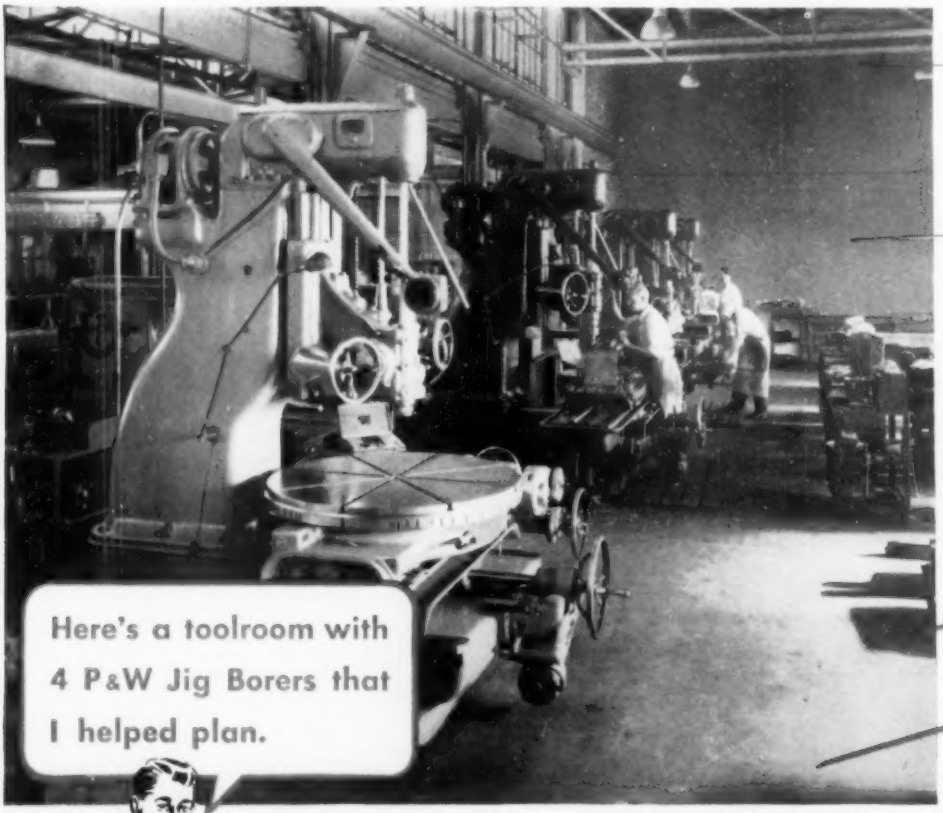
Bring the P&W Engineer into your Toolroom Picture

Labor's up! Material's up! Competition looms on both price and quality. Manufacturing survival and jobs depend on meeting it. What to do? Here's one thing . . .

Bring your Pratt & Whitney Engineer into the picture. As a starter, let him survey your toolroom set up. That's one good place to look for cost-cutting chances. He'll know how to find them. He's thorough.

He'll study the complete layout. Materials, methods, requirements and equipment will have his close scrutiny. He'll check them all against known standards. Then, he'll report to you with recommendations for any action that will result in higher efficiency and lower cost. And his services are yours for the asking, without obligation.

Write us a letter now, while you think of it, and also ask for your P&W Condensed Catalogue.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

PUBLISHED MONTHLY BY

THE TOOL ENGINEER

AMERICAN SOCIETY OF TOOL ENGINEERS

Volume XVIII **May, 1947** **Number 4**

Editorial

Robert B. Powers . . . . . *Executive Editor*
A. E. Rylander . . . . . *Technical Editor*
Fred W. Steiner . . . . . *Editorial Associate*
Doris B. Pratt . . . . *A.S.T.E. News Editor*
Nik Varkula . . . . . *Technical Art Director*

Advertising

Clarence T. Etter . . . . . *Advertising Mgr.*
B. B. Wellman *Assistant Advertising Mgr.*

Editorial Committee

W. B. McClellan . . . . . *Chairman*
K. C. Jasper . . . . . *Vice-Chairman*
Foster C. Koehn . . . . . *Secretary*
John A. Lapham Michael J. Radecki
H. L. Tigges

Officers

W. B. Peirce . . . . . *President*
I. F. Holland . . . . . *First Vice-President*
R. B. Douglas . . . . . *Second Vice-President*
George C. Johnson . . . *Third Vice-President*
W. A. Dawson . . . . . *Secretary*
V. H. Ericson . . . . . *Treasurer*
H. E. Conrad . . . . . *Executive Secretary*

Board of Directors

W. B. Peirce, *Chairman*

C. B. Cole — I. F. Holland
H. E. Collins — T. P. Orchard
A. J. Denis — A. M. Sargent
R. B. Douglas — A. M. Schmit
G. S. Wilcox, Jr.

TABLE OF CONTENTS

PAGE

EDITORIAL—SUNRISE IN DIXIE . . . . . *by W. B. Peirce* 17
DRAWING DIE PROBLEMS AND FORMULAE . *by James Walker* 18
PART TWO OF A SERIES
APPLICATION OF GEOPHYSICAL INSTRUMENTS TO OIL PROSPECTING . . . . . *by J. H. Dunaway* 24
RECENT DEVELOPMENTS IN CRUSH GRINDING THREAD AND ANNULAR FORMS . . *by C. J. Linxweiler* 27
NUMERICAL CLASSIFICATION—A MILESTONE IN STANDARDS PROGRESS . . . . *by John M. Cannon* 33
NEW DIAMOND DIE DRILLING METHOD . . *by U. S. Bureau of Standards* 35
REPORT ON FLEXIBLE MOLDS . . *by Thomas A. Dickinson* 38
REVIEWS AND PREVIEWS . . . . . *by Fred W. Steiner* 42
"NEWS" IN THE WELDING WORLD . . . *by Vanners Borg* 44

DEPARTMENTS

FUNDAMENTALS OF TOOL ENGINEERING 45
ANDYGRAMS 47
A.S.T.E. NEWS 49
GADGETS 65
BULLETINS 66
GOOD READING 67
TOOLS OF TODAY 68
NORTH, EAST, WEST, SOUTH IN INDUSTRY 74
INDEX TO ADVERTISERS 150

American Society of Tool Engineers

National Headquarters

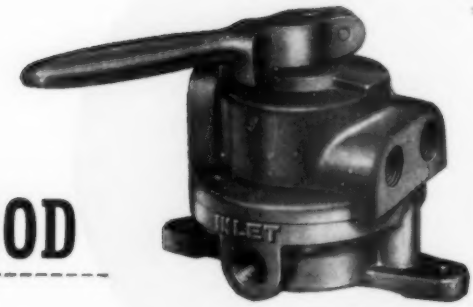
Phone: CHerry 8082
1666 Penobscot Bldg. Detroit 26, Michigan

The TOOL ENGINEER
Editorial and Advertising Offices:
Phone: TEmple 2-2560
1922 West Canfield Detroit 8, Michigan

The Tool Engineer is published monthly at 1666 Penobscot Building, Detroit 26, Michigan, in the interest of the members of the American Society of Tool Engineers. Advertising and Editorial departments are located at 1922 West Canfield, Detroit 8, Michigan. Subscription is $2.00 per year. Non-members $6.00 per year in the U.S.A., Canada $6.50 per year; all other foreign countries, $8.00 per year. Copyright 1947 by the American Society of Tool Engineers. Entered as second-class matter February 8, 1945, at the post office at Detroit, Michigan, under the Act of March, 1879.

a **GOOD** air cylinder . . .

deserves a **GOOD**



operating valve

No need to take chances
Use valves you can **count** on.
The Hannifin Packless Valve
Design **insures** year after year of
maintenance free service.

- *48 low cost models to choose from.*

You obtain maximum service from
Hannifin Air Cylinders

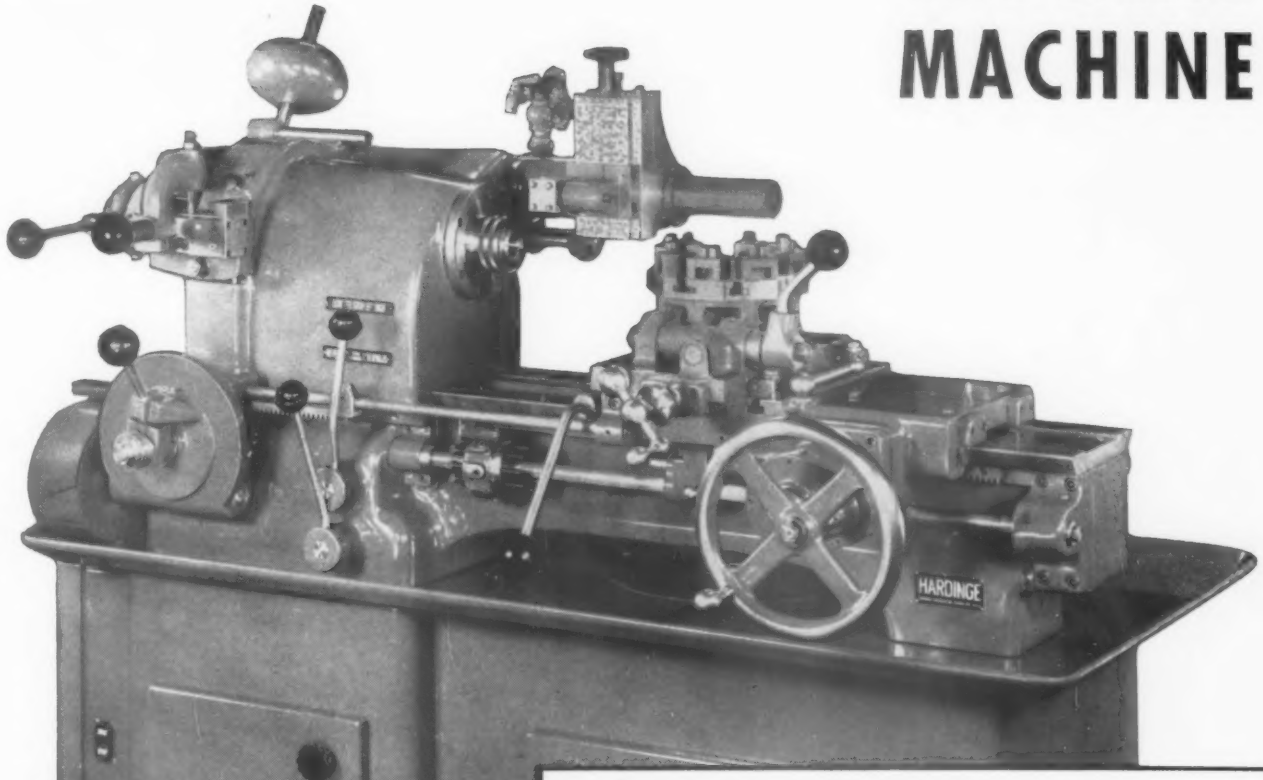
- *10 sizes 1" to 12" bore*
- *6 basic mounting styles*
- *Piston stroke as specified*

Request bulletin 57-A.

HANNIFIN
CORPORATION
Chicago 24

HARDINGE
ELMIRA, N.Y.

announces a NEW CHUCKING MACHINE



The Hardinge *Multi-Operation* Chucking Machine fills the gap between second operation machines and large turret lathes.

SOME FEATURES ARE:

- Eight Position Cross Feeding Turret
- Adjustable Turret Stations
- Screw and Lever Feed for Cross Slide
- Power Feed for Turning and Boring
- Dovetail Bed with Hardened Steel Ways
- Production Threading Head
- Automatic Thread Length Control

HARDINGE
DOVETAIL BED
6" Step Chuck,
1" Collet Capacity

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Directory of A.S.T.E. Chapter Chairmen

AKRON CHAPTER, NO. 47
Second Thursday *
Herman A. Guy, *Chairman*
R. D. No. 1, Alliance, Ohio

ATLANTA CHAPTER, NO. 61
Third Monday *
Dwight L. Hollowell, *Chairman*
3174 Peachtree Dr., N. E.,
Atlanta 5, Ga.

BALTIMORE CHAPTER, NO. 13
First Wednesday *
Thomas F. Burke, *Chairman*
2802 Kennedy Ave.,
Baltimore 18, Md.

BINGHAMTON CHAPTER, NO. 35
1st Wed. after 1st Mon.*
Roland B. Andrews, *Chairman*
461 Vestal Road,
Binghamton, N. Y.

BOSTON CHAPTER, NO. 33
Second Thursday *
John Ryneska, *Chairman*
Western Ave. 69-A,
E. Lynn, Mass.

BUFFALO-NIAGARA FRONTIER CHAPTER, NO. 10
Second Wednesday *
Albert Kirchgessner, *Chairman*
127 Columbia Drive,
Williamsville, N. Y.

CEDAR RAPIDS CHAPTER, NO. 71
Third Wednesday *
Robert A. Hruska, *Chairman*
2011 D Ave., N. E.,
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA CHAPTER, NO. 22
Second Tuesday *
Paul P. Stock, *Chairman*
460 Edgehill Rd., York, Penn.

CHICAGO CHAPTER, NO. 5
First Monday *
Fred J. Schmitt, *Chairman*
D. A. Stuart Oil Co.,
2727 So. Troy St.,
Chicago 23, Ill.

CINCINNATI CHAPTER, NO. 21
Second Tuesday *
George R. Squibb, *Chairman*
R.R. No. 1, Box 143-K,
Cincinnati 27, Ohio

CLEVELAND CHAPTER, NO. 3
Second Friday *
Edgar W. Baumgardner, *Chairm'n*
Industrial Ovens, Inc.,
13825 Triskett Road,
Cleveland 11, Ohio

COLUMBUS CHAPTER, NO. 36
Second Wednesday *
Walter E. L. Bock, *Chairman*
323 Southwood Ave.,
Columbus, Ohio

DAYTON CHAPTER, NO. 18
Second Monday *
Edgar J. Seifreat, *Chairman*
Seifreat Elstad Mach. Co.,
P.O. Box 332, Dayton 1, Ohio

DECATUR CHAPTER, NO. 58
Second Monday *
Ray W. Howell, *Chairman*
1476 W. Decatur, Decatur, Ill.

DETROIT CHAPTER, NO. 1
Second Thursday *
Leslie B. Bellamy, *Chairman*
Sterling Grinding Wheel Co.,
220 E. Milwaukee Ave.,
Detroit 2, Mich.

ELMIRA CHAPTER, NO. 24
First Monday *
Edward Stachel, *Chairman*
927 Spruce St., Elmira, N. Y.

ERIE CHAPTER, NO. 62
First Tuesday *
Mathew H. Hetzel, *Chairman*
1140 West 31st St., Erie, Pa.

EVANSVILLE CHAPTER, NO. 73
Second Monday *
Frank J. Hausfeld, Jr., *Chairman*
R.R. No. 5, Box 30,
Evansville, Ind.

FAIRFIELD COUNTY CHAPTER, NO. 6
First Wednesday *
Arthur R. Hunt, *Chairman*
64 Avon St., Devon 2, Conn.

FLINT CHAPTER, NO. 68
Third Thursday *
Norman F. Snyder, *Chairman*
2006 Mt. Elliott, Flint 4, Mich.

FOND DU LAC CHAPTER, NO. 45
Second Friday *
William E. Rutz, *Chairman*
142 Doty St., Fond Du Lac, Wis.

FORT WAYNE CHAPTER, NO. 56
Second Wednesday *
Emil W. Mellin, *Chairman*
914 W. Sherwood Terrace,
Fort Wayne 6, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Roy G. Frogness, *Chairman*
Box 304, Rt. 3, Aurora, Ill.

GOLDEN GATE CHAPTER, NO. 28
Third Wednesday *
Floyd V. Snodgrass, *Chairman*
2601 Maxwell Ave.,
Oakland 2, Calif.

HAMILTON CHAPTER, NO. 42
Second Friday *
William A. Alexander, *Chairman*
88 Prospect St. S.,
Hamilton, Ont.

HARTFORD CHAPTER, NO. 7
First Monday *
Richard A. Smith, *Chairman*
28 Harvard St.,
Hartford 6, Conn.

HOUSTON CHAPTER, NO. 29
Second Tuesday *
Homer Briggs, *Chairman*
6514 Pinehurst,
Houston 3, Texas

INDIANAPOLIS CHAPTER, NO. 37
First Thursday *
John Horton, *Chairman*
816 N. Audubon Road,
Indianapolis 1, Ind.

KANSAS CITY CHAPTER, NO. 57
First Wednesday *
Leroy E. Campbell, *Chairman*
5912 College Ave.,
Kansas City 4, Mo.

LITTLE RHODY CHAPTER, NO. 53
Third Wednesday *
Wilfred J. Pender, *Chairman*
43 Seba Kent Road,
Pawtucket, R. I.

LOS ANGELES CHAPTER, NO. 27
Second Thursday *
Leslie F. Hawes, *Chairman*
1421 N. Edgemont,
Los Angeles 27, Calif.

LOUISVILLE CHAPTER, NO. 54
Second Tuesday *
John E. Paskey, *Chairman*
2322 Greenwood Ave.,
Louisville 11, Ky.

MADISON CHAPTER, NO. 75
1st Tues. after 1st Mon.*
Fred H. Kessenich, *Chairman*
308 E. Wilson St.,
Madison 3, Wis.

MID-HUDSON CHAPTER, NO. 74
First Wednesday *
John L. Petz, *Chairman*
Pendell Road,
Poughkeepsie, N. Y.

MILWAUKEE CHAPTER, NO. 4
Second Thursday *
Paul E. Butzin, *Chairman*
8104 Richmond Court,
Wauwatosa 13, Wis.

MONTREAL CHAPTER, NO. 50
Second Wednesday *
Henry T. Welch, *Chairman*
732 Victoria Ave.,
St. Lambert, Que.

MUNCIE CHAPTER, NO. 70
Second Wednesday *
Robert L. Waters, *Chairman*
806 Weber Drive, Muncie, Ind.

NASHVILLE CHAPTER, NO. 43
Third Friday *
Guy Hamilton, *Chairman*
Manufacturers Agent
518 3rd Nat'l Bank Bldg.,
Nashville 3, Tenn.

NEW HAVEN CHAPTER, NO. 41
Second Thursday *
Ray E. Gifford, *Chairman*
96 Kimberly Ave.,
East Haven 12, Conn.

NEW ORLEANS CHAPTER, NO. 60
Second Wednesday *
Carl Hazlewood, *Chairman*
6574 General Haig
New Orleans 19, La.

NEW YORK, GREATER, CHAPTER, NO. 34
First Monday *
Harmon S. Hunt, *Chairman*
325 Cherry St.,
Douglaston, L. I., N. Y.

NIAGARA DISTRICT CHAPTER, NO. 65
Second Friday *
William L. Sandham, *Chairman*
94 Duncop Drive,
St. Catharines, Ont.

NORTH TEXAS CHAPTER, NO. 51
2nd Fri. (Tentative) *
Theodore A. Hersh, *Chairman*
2901 Westridge Ave.,
Ft. Worth 7, Texas

NORTHERN NEW JERSEY CHAPTER, NO. 14
Second Tuesday *
Edward T. Ross, *Chairman*
223 Bellevue Ave.,
Upper Montclair, N. J.

PEORIA CHAPTER, NO. 31
First Tuesday *
R. C. Kolb, *Chairman*
98 N. Maplewood Ave.,
Peoria 5, Ill.

PHILADELPHIA CHAPTER, NO. 15
Third Thursday *
Arthur R. Diamond, *Chairman*
Greene Manor,
Johnson and Greene Sts.,
Philadelphia 44, Pa.

PHOENIX CHAPTER, NO. 67
Third Wednesday *
Harry E. Rives, *Chairman*
Rt. No. 1, Box 43-D,
Tempe, Arizona

PITTSBURGH CHAPTER, NO. 8
First Friday *
Paul H. Magnus, *Chairman*
Tranter Mfg. Co.,
105 Water St.,
Pittsburgh 22, Pa.

PONTIAC CHAPTER, NO. 69
Third Thursday *
Albert J. Rhodes, *Chairman*
1245 Rhodes Rd.,
Lake Orion, Mich.

PORTLAND (MAINE) CHAPTER, NO. 46
Fourth Friday *
Carl L. Bohlin, *Chairman*
28 Hall Ave., Saco, Maine

PORTLAND (OREGON) CHAPTER, NO. 63
Third Thursday *
William E. Brennan, *Chairman*
3036 S.E. 33rd Ave.,
Portland 2, Ore.

POTOMAC CHAPTER, NO. 48
First Thursday *
Richard P. Thayer, *Chairman*
4704 Butterworth Pl., N.W.,
Washington 16, D. C.

RACINE CHAPTER, NO. 2
First Monday *
William P. Clark, *Chairman*
2105 Washington Ave.,
Racine, Wis.

RICHMOND CHAPTER, NO. 66
Second Tuesday *
Lowell B. Penland, *Chairman*
2509 E. Main St.,
Richmond, Ind.

ROCHESTER CHAPTER, NO. 16
Second Wednesday *
Milton L. Roessel, *Chairman*
97 Biltmore Drive,
Rochester 12, N. Y.

ROCKFORD CHAPTER, NO. 12
First Thursday *
Earnest Y. Seborg, *Chairman*
1523 Huffman Blvd.,
Rockford, Ill.

ST. LOUIS CHAPTER, NO. 17
First Thursday *
Edward H. Ruder, *Chairman*
57 Hanley Downs,
Richmond Heights 17, Mo.

SAN DIEGO CHAPTER, NO. 44
Second Tuesday *
Raymond W. Peters, *Chairman*
2442 Comstock Drive
San Diego 11, Calif.

SCHENECTADY CHAPTER, NO. 20
Second Thursday *
John Stedman, *Chairman*
54 Broderick St.
Albany 5, N. Y.

SEATTLE CHAPTER, NO. 39
Second Tuesday *
Gordon Munro, *Chairman*
Rt. 4, Box 2432
Bremerton, Wash.

SOUTH BEND CHAPTER, NO. 30
Second Tuesday *
Edgar W. Helm, *Chairman*
1152 E. Victoria St.,
South Bend 14, Ind.

SPRINGFIELD (ILLINOIS) CHAPTER, NO. 64
First Tuesday *
Henry G. Becker, *Chairman*
830 No. 5th St.,
Springfield, Ill.

SPRINGFIELD (MASS.) CHAPTER, NO. 32
Second Monday *
Alexander W. Todd, *Chairman*
50 Johnson St.,
Springfield 8, Mass.

SPRINGFIELD (OHIO) CHAPTER, NO. 76
Second Thursday *
James B. Douglas, *Chairman*
609 E. McCreight,
Springfield, Ohio

SYRACUSE CHAPTER, NO. 19
1st Thurs. after 2nd Mon.*
Hugo C. Klix, *Chairman*
425 Glenwood Ave.,
Syracuse 7, N. Y.

TOLEDO CHAPTER, NO. 9
Second Wednesday *
Albert Hage, *Chairman*
3700 Roanoke Rd.,
Toledo 12, Ohio

TORONTO CHAPTER, NO. 26
Second Monday *
L. M. Jardine, *Chairman*
6 Pepler Ave., Toronto, Ont.

TRI CITIES CHAPTER, NO. 23
Third Monday *
Lennart N. Dahlen, *Chairman*
901 43rd St.
Rock Island, Ill.

TWIN CITIES CHAPTER, NO. 11
First Wednesday *
Clifford V. Lofdahl, *Chairman*
5933 Elliott Ave. S.,
Minneapolis 7, Minn.

TWIN STATES CHAPTER, NO. 40
Second Wednesday *
Alan E. Stubbs, *Chairman*
Highland Rd., Springfield, Vt.

WESTERN MICHIGAN CHAPTER, NO. 38
Second Monday *
Peter C. Maghielse, *Chairman*
2434 Miller Ave., N. W.,
Grand Rapids 4, Mich.

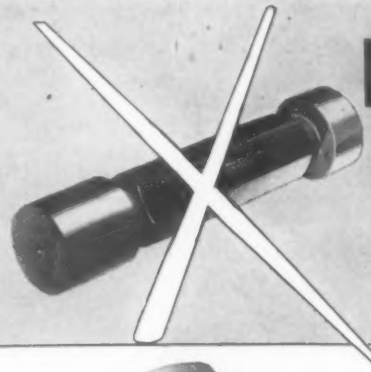
WICHITA CHAPTER, NO. 52
Second Wednesday *
Harold J. Bales, *Chairman*
1702 N. Lorraine Ave.,
Wichita 6, Kan.

WILLIAMSPORT CHAPTER, NO. 49
Second Monday *
Lewis H. Bardo, *Chairman*
2347 Hillside Ave.,
Williamsport, Penn.

WINDSOR CHAPTER, NO. 55
Second Monday *
R. T. Richards, *Chairman*
R.R. No. 1, Windsor, Ont.

WORCESTER CHAPTER, NO. 25
First Tuesday *
Charles W. Monigle, *Chairman*
364 Greenwood St., R.F.D. 2,
Millbury, Mass.

* CHAPTER MEETING NIGHT



DuBo Gages are going over!

Orders and re-orders demonstrate DuBo superiority over cylindrical plug gages

DuBo* Plug Gage

checks bores FASTER, more accurately!

SINGLE END
Sizes 1.510" to 6.010"
(38 mm. to 152 mm.)

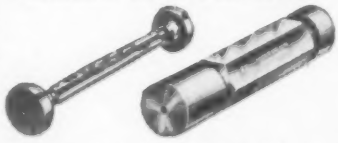
DOUBLE END
Sizes .240" to 1.510"
(6 mm. to 38 mm.)

Enthusiastic users all over the country are rapidly replacing cylindrical plug gages with DuBo Gages. The first use unmistakably demonstrates DuBo superiority — its extreme lightness, its ability to detect dimensional deviations (taper and out-of-roundness), its ease, speed and accuracy. STANDARD representatives in leading industrial centers will gladly arrange a demonstration for YOU.

WRITE FOR BULLETIN

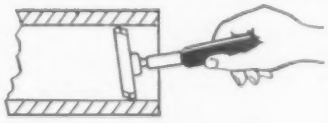
*Patents Pending

LIGHT IN WEIGHT



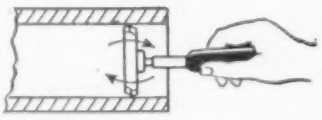
DuBo Gages weigh 70% to 80% less than cylindrical plug gages of equivalent size. Lighter weight means less fatigue, greater accuracy.

EASY TO ENTER



DuBo is entered easily by tipping handle slightly above bore axis (no jockeying necessary). Enters even under-sized bores easily.

DEFINITE CHECK



Enter gage, rock handle gently, bringing spherical gaging surface in contact with bore wall. Whether or not handle drops freely below center is definite yes-or-no answer.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

Directory of A.S.T.E. Chapter Chairmen

AKRON CHAPTER, NO. 47
Second Thursday *
Herman A. Guy, *Chairman*
R. D. No. 1, Alliance, Ohio

ATLANTA CHAPTER, NO. 61
Third Monday *
Dwight L. Hollowell, *Chairman*
3174 Peachtree Dr., N. E.,
Atlanta 5, Ga.

BALTIMORE CHAPTER, NO. 13
First Wednesday *
Thomas F. Burke, *Chairman*
2802 Kennedy Ave.,
Baltimore 18, Md.

BINGHAMTON CHAPTER, NO. 35
1st Wed. after 1st Mon.*
Roland B. Andrews, *Chairman*
461 Vestal Road,
Binghamton, N. Y.

BOSTON CHAPTER, NO. 33
Second Thursday *
John Ryneska, *Chairman*
Western Ave. 69-A,
E. Lynn, Mass.

BUFFALO-NIAGARA FRONTIER CHAPTER, NO. 10
Second Wednesday *
Albert Kirchgessner, *Chairman*
127 Columbia Drive,
Williamsville, N. Y.

CEDAR RAPIDS CHAPTER, NO. 71
Third Wednesday *
Robert A. Hruska, *Chairman*
2011 D Ave., N. E.,
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA CHAPTER, NO. 22
Second Tuesday *
Paul P. Stock, *Chairman*
460 Edgehill Rd., York, Penn.

CHICAGO CHAPTER, NO. 5
First Monday *
Fred J. Schmitt, *Chairman*
D. A. Stuart Oil Co.,
2727 So. Troy St.,
Chicago 23, Ill.

CINCINNATI CHAPTER, NO. 21
Second Tuesday *
George R. Squibb, *Chairman*
R.R. No. 1, Box 143-K,
Cincinnati 27, Ohio

CLEVELAND CHAPTER, NO. 3
Second Friday *
Edgar W. Baumgardner, *Chairm'n*
Industrial Ovens, Inc.,
13825 Triskett Road,
Cleveland 11, Ohio

COLUMBUS CHAPTER, NO. 36
Second Wednesday *
Walter E. L. Bock, *Chairman*
323 Southwood Ave.,
Columbus, Ohio

DAYTON CHAPTER, NO. 18
Second Monday *
Edgar J. Seifreat, *Chairman*
Seifreat Elstad Mach. Co.,
P.O. Box 332, Dayton 1, Ohio

DECATUR CHAPTER, NO. 58
Second Monday *
Ray W. Howell, *Chairman*
1476 W. Decatur, Decatur, Ill.

DETROIT CHAPTER, NO. 1
Second Thursday *
Leslie B. Bellamy, *Chairman*
Sterling Grinding Wheel Co.,
220 E. Milwaukee Ave.,
Detroit 2, Mich.

ELMIRA CHAPTER, NO. 24
First Monday *
Edward Stachel, *Chairman*
927 Spruce St., Elmira, N. Y.

ERIE CHAPTER, NO. 62
First Tuesday *
Mathew H. Hetzel, *Chairman*
1140 West 31st St., Erie, Pa.

EVANSVILLE CHAPTER, NO. 73
Second Monday *
Frank J. Hausfeld, Jr., *Chairman*
R.R. No. 5, Box 30,
Evansville, Ind.

FAIRFIELD COUNTY CHAPTER, NO. 6
First Wednesday *
Arthur R. Hunt, *Chairman*
64 Avon St., Devon 2, Conn.

FLINT CHAPTER, NO. 68
Third Thursday *
Norman F. Snyder, *Chairman*
2006 Mt. Elliott, Flint 4, Mich.

FOND DU LAC CHAPTER, NO. 45
Second Friday *
William E. Rutz, *Chairman*
142 Doty St., Fond Du Lac, Wis.

FORT WAYNE CHAPTER, NO. 56
Second Wednesday *
Emil W. Mellin, *Chairman*
914 W. Sherwood Terrace,
Fort Wayne 6, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Roy G. Frogness, *Chairman*
Box 304, Rt. 3, Aurora, Ill.

GOLDEN GATE CHAPTER, NO. 28
Third Wednesday *
Floyd V. Snodgrass, *Chairman*
2601 Maxwell Ave.,
Oakland 2, Calif.

HAMILTON CHAPTER, NO. 42
Second Friday *
William A. Alexander, *Chairman*
88 Prospect St. S.,
Hamilton, Ont.

HARTFORD CHAPTER, NO. 7
First Monday *
Richard A. Smith, *Chairman*
28 Harvard St.,
Hartford 6, Conn.

HOUSTON CHAPTER, NO. 29
Second Tuesday *
Homer Briggs, *Chairman*
6514 Pinehurst,
Houston 3, Texas

INDIANAPOLIS CHAPTER, NO. 37
First Thursday *
John Horton, *Chairman*
816 N. Audubon Road,
Indianapolis 1, Ind.

KANSAS CITY CHAPTER, NO. 57
First Wednesday *
Leroy E. Campbell, *Chairman*
5912 College Ave.,
Kansas City 4, Mo.

LITTLE RHODY CHAPTER, NO. 53
Third Wednesday *
Wilfred J. Pender, *Chairman*
43 Seba Kent Road,
Pawtucket, R. I.

LOS ANGELES CHAPTER, NO. 27
Second Thursday *
Leslie F. Hawes, *Chairman*
1421 N. Edgemont,
Los Angeles 27, Calif.

LOUISVILLE CHAPTER, NO. 54
Second Tuesday *
John E. Paskey, *Chairman*
2322 Greenwood Ave.,
Louisville 11, Ky.

MADISON CHAPTER, NO. 75
1st Tues. after 1st Mon.*
Fred H. Kessenich, *Chairman*
308 E. Wilson St.,
Madison 3, Wis.

MID-HUDSON CHAPTER, NO. 74
First Wednesday *
John L. Petz, *Chairman*
Pendell Road,
Poughkeepsie, N. Y.

MILWAUKEE CHAPTER, NO. 4
Second Thursday *
Paul E. Butzin, *Chairman*
8104 Richmond Court,
Wauwatosa 13, Wis.

MONTREAL CHAPTER, NO. 50
Second Wednesday *
Henry T. Welch, *Chairman*
732 Victoria Ave.,
St. Lambert, Que.

MUNCIE CHAPTER, NO. 70
Second Wednesday *
Robert L. Waters, *Chairman*
806 Weber Drive, Muncie, Ind.

NASHVILLE CHAPTER, NO. 43
Third Friday *
Guy Hamilton, *Chairman*
Manufacturers Agent
518 3rd Nat'l Bank Bldg.,
Nashville 3, Tenn.

NEW HAVEN CHAPTER, NO. 41
Second Thursday *
Ray E. Gifford, *Chairman*
96 Kimberly Ave.,
East Haven 12, Conn.

NEW ORLEANS CHAPTER, NO. 60
Second Wednesday *
Carl Hazlewood, *Chairman*
6574 General Haig
New Orleans 19, La.

NEW YORK, GREATER, CHAPTER, NO. 34
First Monday *
Harmon S. Hunt, *Chairman*
325 Cherry St.,
Douglaston, L. I., N. Y.

NIAGARA DISTRICT CHAPTER, NO. 65
Second Friday *
William L. Sandham, *Chairman*
94 Duncop Drive,
St. Catharines, Ont.

NORTH TEXAS CHAPTER, NO. 51
2nd Fri. (Tentative) *
Theodore A. Hersh, *Chairman*
2901 Westridge Ave.,
Ft. Worth 7, Texas

NORTHERN NEW JERSEY CHAPTER, NO. 14
Second Tuesday *
Edward T. Ross, *Chairman*
223 Bellevue Ave.,
Upper Montclair, N. J.

PEORIA CHAPTER, NO. 31
First Tuesday *
R. C. Kolb, *Chairman*
98 N. Maplewood Ave.,
Peoria 5, Ill.

PHILADELPHIA CHAPTER, NO. 15
Third Thursday *
Arthur R. Diamond, *Chairman*
Greene Manor,
Johnson and Greene Sts.,
Philadelphia 44, Pa.

PHOENIX CHAPTER, NO. 67
Third Wednesday *
Harry E. Rives, *Chairman*
Rt. No. 1, Box 43-D,
Tempe, Arizona

PITTSBURGH CHAPTER, NO. 8
First Friday *
Paul H. Magnus, *Chairman*
Tranter Mfg. Co.,
105 Water St.,
Pittsburgh 22, Pa.

PONTIAC CHAPTER, NO. 69
Third Thursday *
Albert J. Rhodes, *Chairman*
1245 Rhodes Rd.,
Lake Orion, Mich.

PORTLAND (MAINE) CHAPTER, NO. 46
Fourth Friday *
Carl L. Bohlin, *Chairman*
28 Hall Ave., Saco, Maine

PORTLAND (OREGON) CHAPTER, NO. 63
Third Thursday *
William E. Brennan, *Chairman*
3036 S.E. 33rd Ave.,
Portland 2, Ore.

POTOMAC CHAPTER, NO. 48
First Thursday *
Richard P. Thayer, *Chairman*
4704 Butterworth Pl., N.W.,
Washington 16, D. C.

RACINE CHAPTER, NO. 2
First Monday *
William P. Clark, *Chairman*
2105 Washington Ave.,
Racine, Wis.

RICHMOND CHAPTER, NO. 66
Second Tuesday *
Lowell B. Penland, *Chairman*
2509 E. Main St.,
Richmond, Ind.

ROCHESTER CHAPTER, NO. 16
Second Wednesday *
Milton L. Roessel, *Chairman*
97 Biltmore Drive,
Rochester 12, N. Y.

ROCKFORD CHAPTER, NO. 12
First Thursday *
Earnest Y. Seborg, *Chairman*
1523 Huffman Blvd.,
Rockford, Ill.

ST. LOUIS CHAPTER, NO. 17
First Thursday *
Edward H. Ruder, *Chairman*
57 Hanley Downs,
Richmond Heights 17, Mo.

SAN DIEGO CHAPTER, NO. 44
Second Tuesday *
Raymond W. Peters, *Chairman*
2442 Comstock Drive
San Diego 11, Calif.

SCHENECTADY CHAPTER, NO. 20
Second Thursday *
John Stedman, *Chairman*
54 Broderick St.
Albany 5, N. Y.

SEATTLE CHAPTER, NO. 39
Second Tuesday *
Gordon Munro, *Chairman*
Rt. 4, Box 2432
Bremerton, Wash.

SOUTH BEND CHAPTER, NO. 30
Second Tuesday *
Edgar W. Helm, *Chairman*
1152 E. Victoria St.,
South Bend 14, Ind.

SPRINGFIELD (ILLINOIS) CHAPTER, NO. 64
First Tuesday *
Henry G. Becker, *Chairman*
830 No. 5th St.,
Springfield, Ill.

SPRINGFIELD (MASS.) CHAPTER, NO. 32
Second Monday *
Alexander W. Todd, *Chairman*
50 Johnson St.,
Springfield 8, Mass.

SPRINGFIELD (OHIO) CHAPTER, NO. 76
Second Thursday *
James B. Douglas, *Chairman*
609 E. McCreight,
Springfield, Ohio

SYRACUSE CHAPTER, NO. 19
1st Thurs. after 2nd Mon.*
Hugo C. Klix, *Chairman*
425 Glenwood Ave.,
Syracuse 7, N. Y.

TOLEDO CHAPTER, NO. 9
Second Wednesday *
Albert Hage, *Chairman*
3700 Roanoke Rd.,
Toledo 12, Ohio

TORONTO CHAPTER, NO. 26
Second Monday *
L. M. Jardine, *Chairman*
6 Pepler Ave., Toronto, Ont.

TRI CITIES CHAPTER, NO. 23
Third Monday *
Lennart N. Dahlen, *Chairman*
901 43rd St.
Rock Island, Ill.

TWIN CITIES CHAPTER, NO. 11
First Wednesday *
Clifford V. Lofdahl, *Chairman*
5933 Elliott Ave. S.,
Minneapolis 7, Minn.

TWIN STATES CHAPTER, NO. 40
Second Wednesday *
Alan E. Stubbs, *Chairman*
Highland Rd., Springfield, Vt.

WESTERN MICHIGAN CHAPTER, NO. 38
Second Monday *
Peter C. Maghielse, *Chairman*
2434 Miller Ave., N. W.,
Grand Rapids 4, Mich.

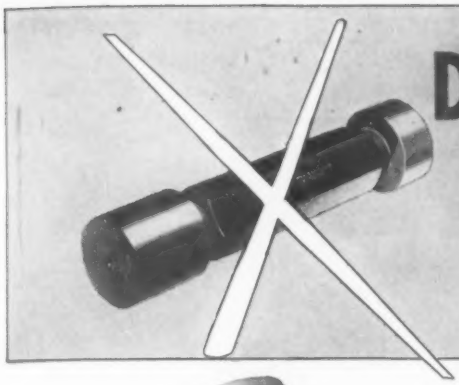
WICHITA CHAPTER, NO. 52
Second Wednesday *
Harold J. Bales, *Chairman*
1702 N. Lorraine Ave.,
Wichita 6, Kan.

WILLIAMSPORT CHAPTER, NO. 49
Second Monday *
Lewis H. Bardo, *Chairman*
2347 Hillside Ave.,
Williamsport, Penn.

WINDSOR CHAPTER, NO. 55
Second Monday *
R. T. Richards, *Chairman*
R.R. No. 1, Windsor, Ont.

WORCESTER CHAPTER, NO. 25
First Tuesday *
Charles W. Monigle, *Chairman*
364 Greenwood St., R.F.D. 2,
Millbury, Mass.

* CHAPTER MEETING NIGHT



DuBo Gages are going over!

Orders and re-orders demonstrate DuBo superiority over cylindrical plug gages

DuBo* Plug Gage

checks bores FASTER, more accurately!

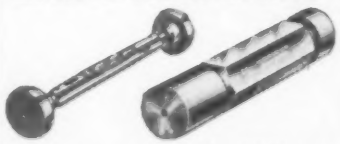
SINGLE END
Sizes 1.510" to 6.010"
(38 mm. to 152 mm.)

DOUBLE END
Sizes .240" to 1.510"
(6 mm. to 38 mm.)

Enthusiastic users all over the country are rapidly replacing cylindrical plug gages with DuBo Gages. The first use unmistakably demonstrates DuBo superiority — its extreme lightness, its ability to detect dimensional deviations (taper and out-of-roundness), its ease, speed and accuracy. STANDARD representatives in leading industrial centers will gladly arrange a demonstration for YOU.

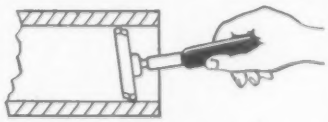
WRITE FOR BULLETIN *Patents Pending

LIGHT IN WEIGHT



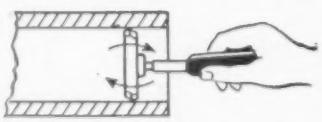
DuBo Gages weigh 70% to 80% less than cylindrical plug gages of equivalent size. Lighter weight means less fatigue, greater accuracy.

EASY TO ENTER



DuBo is entered easily by tipping handle slightly above bore axis (no jockeying necessary). Enters even under-sized bores easily.

DEFINITE CHECK



Enter gage, rock handle gently, bringing spherical gaging surface in contact with bore wall. Whether or not handle drops freely below center is definite yes-or-no answer.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

Here's a "Task Force" that makes Milling Jobs *Move!*

Specify Morse Hi-Helix End Mills for your milling jobs and costs go down thru faster cutting, longer service life and tough-job dependability.

Morse Hi-Helix End Mills have an *edge* over ordinary mills because more than 80 years of cutting tool "savvy" combines with 18-4-1 *High Speed Steel* and *special heat treatment* for toughness without sacrificing cutting ability. Benefits are quickly noticeable in a cutting action smooth, rapid and with a minimum of chatter—plus shear cutting performance that causes the chips to curl and roll out without clogging the flutes.

Remember, too, that Morse Hi-Helix End Mills are properly undercut and ground with a *primary* and *secondary clearance* for use in the general run of materials. "Morse" means more quality in machining—and a full line. Your Industrial Supply Distributor can provide a Morse recommendation in selecting the precise end mill for *your* job.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

New York Store: 130 Lafayette St. • Detroit Store: 2952 East Grand Blvd. • Chicago Store: 570 West Randolph St. • San Francisco Store: 1180 Folsom St.

No. 1895

No. 1896

No. 1900

No. 1903

No. 1902

No. 1895—Hi-Helix Double End Mill. Four flutes. For general end milling.

No. 1887—Hi-Helix Ball End Mill. Two flutes. For milling fillets, round bottom holes, radius-bottom slots, etc.

No. 1896—Hi-Helix Double End Mill. Two flutes. Ideal for milling keyways, slots, channels, etc.

No. 1898—Hi-Helix Single End Mill. Two flutes. For milling keyways and slots from the solid, can be fed directly into work without previous drilling operation.

No. 1900—Hi-Helix Long Single End Mill. For milling out slots, recesses, etc., that cannot be reached by regular length mills.

No. 1895—Small Diameter Hi-Helix Double End Mill. Four flutes.

No. 1896—Small Diameter Hi-Helix Double End Mill. Two flutes.

No. 1903—Hi-Helix Long Single End Mill. Right hand cut—left hand spiral. The tool for deep slots where regular length mills will not reach.

No. 1897—Hi-Helix Single End Mill. For general end milling.

No. 1902—Hi-Helix Single End Mill. Right hand cut—left hand spiral. Used in die work, etc.

No. 1899—Hi-Helix Long Single End Mill. Two flutes. For deep milling of slots which cannot be reached with ordinary length mill.

No. 1887

No. 1898

No. 1895

No. 1896

No. 1897

No. 1899

ANOTHER **FIRST** IN THREAD **ROLLING**

Steinle Centerless

THREAD GENERATORS

-ANNOUNCING-

• THE **NO. 2** *Steinle* Centerless **THREAD GENERATOR** •

which has been in successful operation for the past several years—ROLLING PRECISION THREADS up to 4½" diameter, 4" long, 4 t.p.i.—on high tensile alloy.

Similar in design to the popular and outstandingly successful No. 1 *Steinle*, this larger Generator completes *Steinle* coverage of the entire range of screw threads from No. 6 to 4½" diameter.

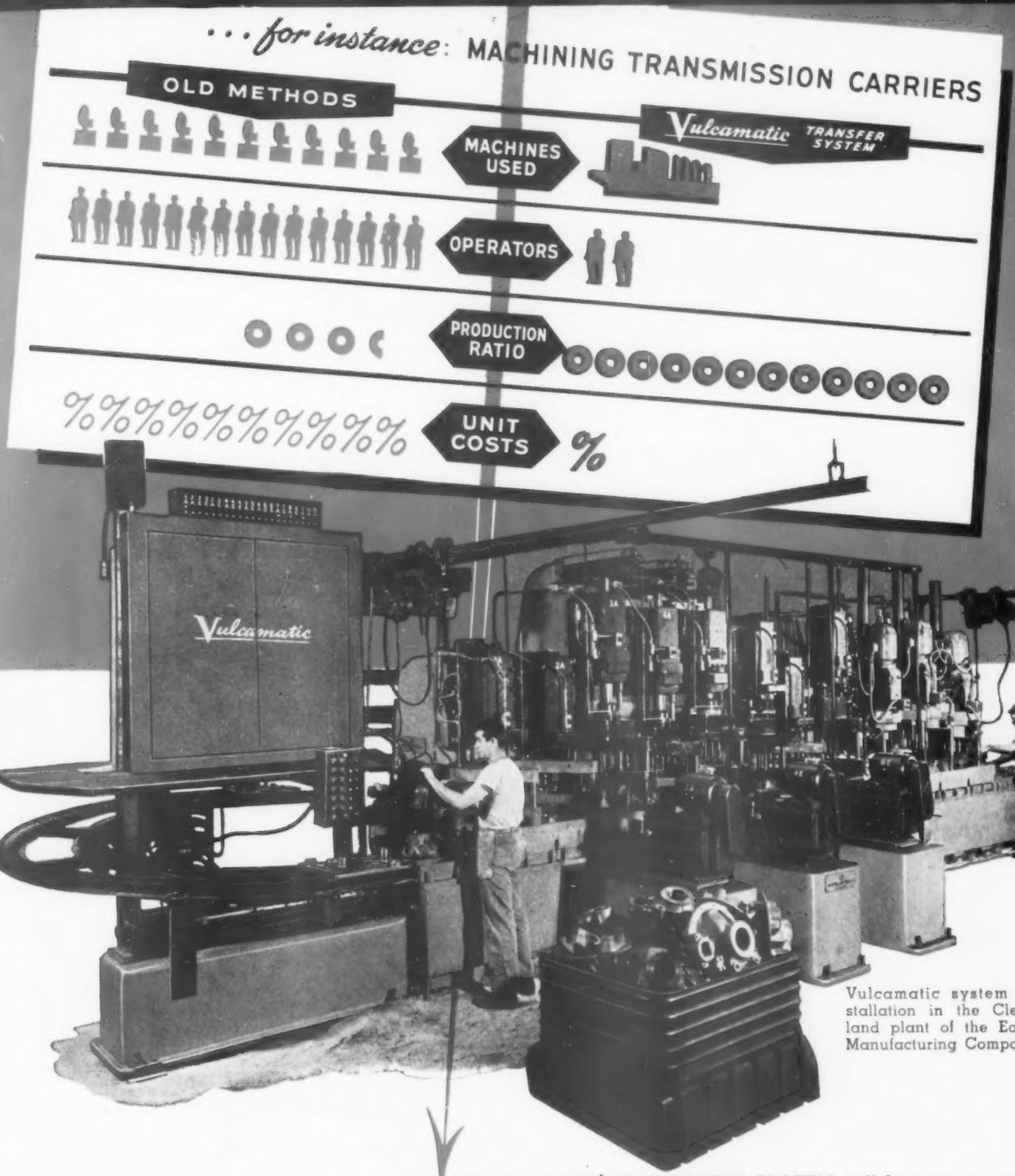
SMALL DIAMETERS
LARGE DIAMETERS
JUST CHANGE THE ROLLS

THE *Steinle* MACHINE COMPANY

HARTFORD, CONNECTICUT

Vulcamatic TRANSFER SYSTEM

LOWERS COSTS • INCREASES PRODUCTION



Vulcamatic system installation in the Cleveland plant of the Eaton Manufacturing Company.

THE VULCAMATIC TRANSFER SYSTEM will lower your costs and increase your production. The VULCAMATIC System consists of a series of machine tool stations grouped together into one *automatic machine* designed to DRILL, REAM, TAP, BORE, COUNTER BORE and MILL a part in any sequence or cycle. THE VULCAMATIC SYSTEM is flexible in construction and can be quickly readjusted to meet any change of part or redesign.

THE VULCAMATIC SYSTEM WILL PAY FOR ITSELF

Vulcan Tool Co.
DAYTON 10 • OHIO • U.S.A.

Our application engineers, located in strategic areas, will be glad to discuss the advantages of a VULCAMATIC TRANSFER SYSTEM installation in your plant.

LANDMATIC

means---

Dependable Production at Low Threading Cost

The Landmatic H type (Hardened and Ground) Die Head is shown threading Oil Well Sucker Rods.

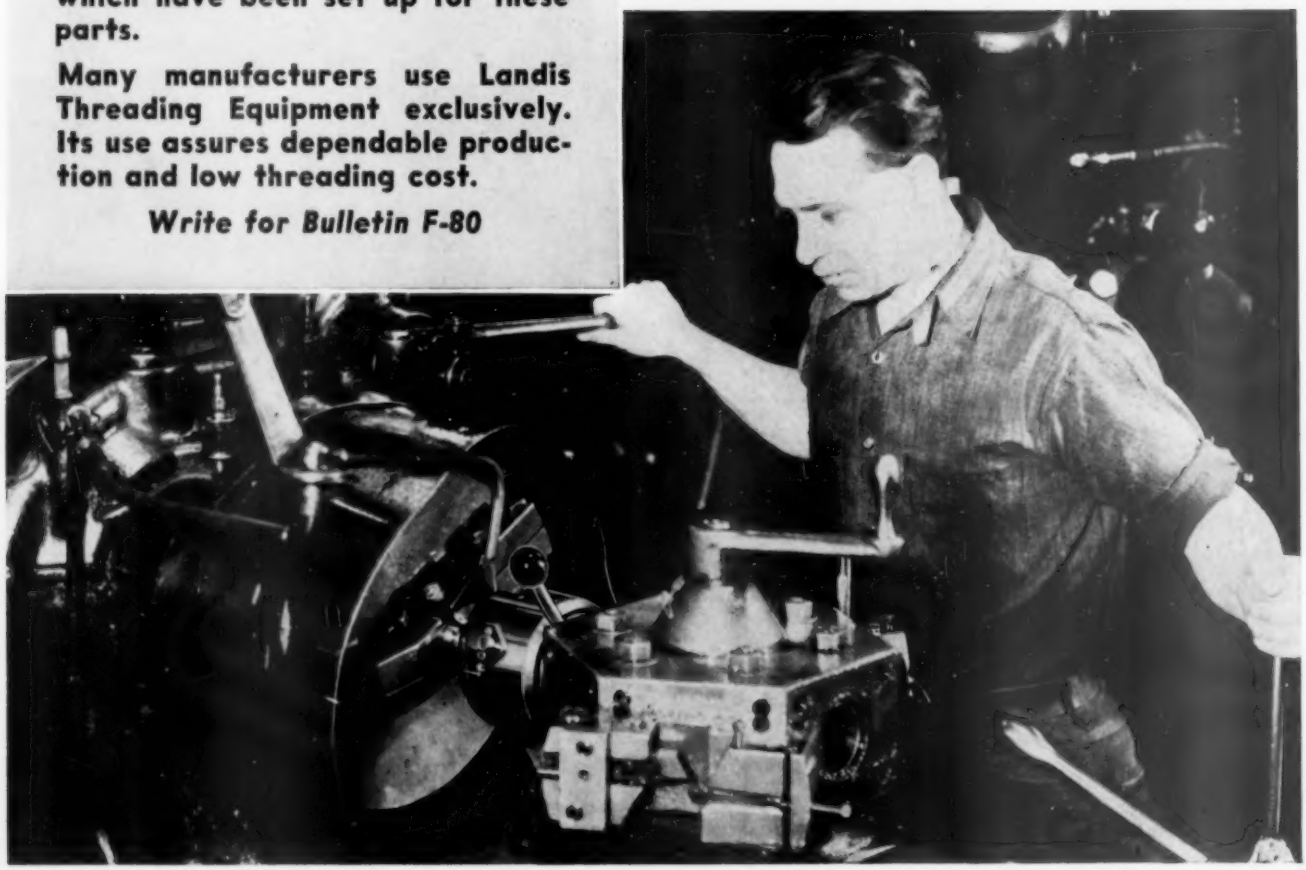
The sturdy rigid construction of the H type Landmatic Head together with the few operating parts, all made from special alloy steel and hardened and ground, assure accurately formed threads well within the close tolerance specifications which have been set up for these parts.

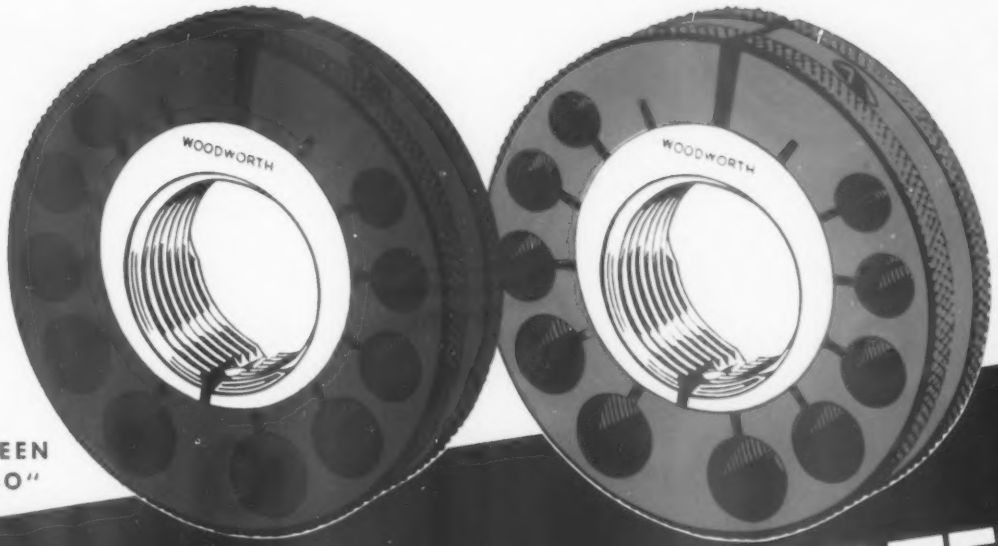
Many manufacturers use Landis Threading Equipment exclusively. Its use assures dependable production and low threading cost.

Write for Bulletin F-80

LANDIS MACHINE *Company*

WAYNESBORO, PA., U.S.A.





RED
"NOT GO"
Pat. Pending

GREEN
"GO"

NEW TESTED-ACCEPTED
THREAD RING GAGES

5-PLUS FEATURES

1. Greater accuracy and stability
2. Longer wear life
3. Less weight
4. Positive identification
5. Positive adjustment

ACCURACY YOU CAN TRUST

WOODWORTH RING GAGES STILL PROVING "ON THE JOB" SUPREMACY OVER ORDINARY GAGES

No wonder more and more industries are adopting this gage as standard. Its revolutionary design assures wear life 5 to 7 times longer. And maintains accurate inspection.

This *proved* gage is easy to adjust, light in weight, durable—it's a *must* for cutting costs, increasing production. Just try the Woodworth Thread Ring Gage on your extra tough job—and you, too, will standardize!

Wire or write for folder No. 46R at no obligation.

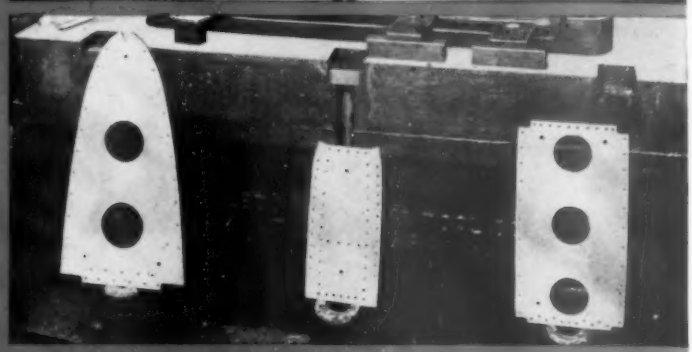
WOODWORTH

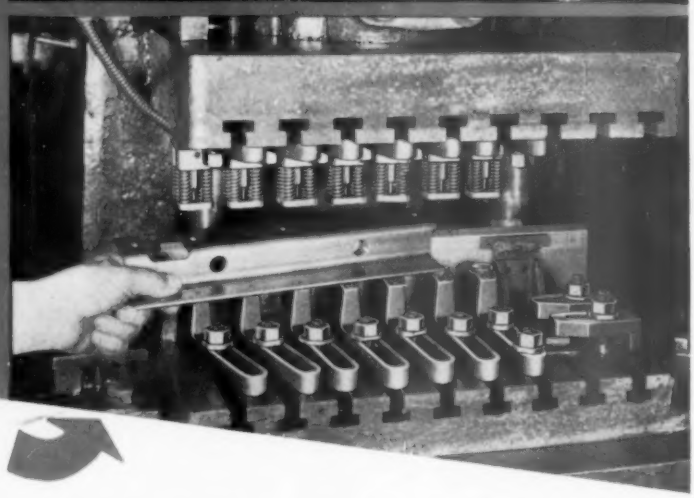
N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINE PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JIGS • SPECIAL TOOLS

Some examples of what can be done with Whistler Adjustable Dies. Work in practically any type press.

Re-use same WHISTLER ADJUSTABLE DIES in unlimited combinations





1 To Pierce Holes of any diameter from 1/32" up.

2 To Perforate Special Shapes.

3 To Notch Corners.

Save production time and reduce product costs by having Whistler punch and die units in your tool room.

Whistler notching dies, group dies and standard units are especially adaptable to combined use in the same set-up. Continued re-use in a variety of arrangements quickly writes off original investment. Reason enough for their expanding popularity with hundreds of America's best known manufacturers.

Now available from stock in a range of diameters up to 3", shipment can be made the same day your order is received. Special sizes, shapes, notching and group dies are made to order in a few days.

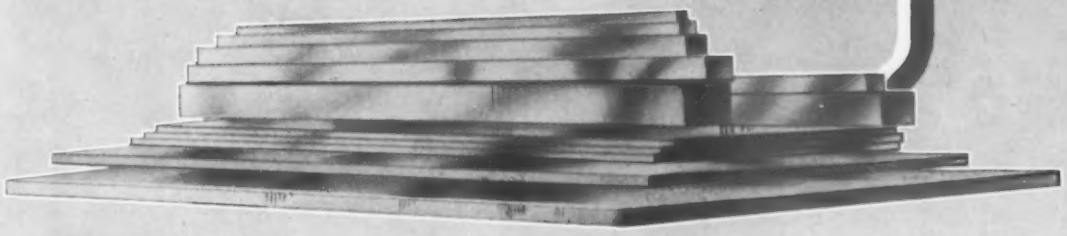
You get production economy plus precision perforating in practically any press with these Whistler dies. Set-ups are easy and fast. No special tools required. Heavy duty series easily pierces 1/4" steel. All parts interchangeable. Tolerances maintained to .0002". There are many other advantages. Get in touch with Whistler.

WRITE FOR YOUR WHISTLER CATALOGS. Know the production advantages of Whistler Adjustable Dies.

S. B. WHISTLER & SONS, INC.

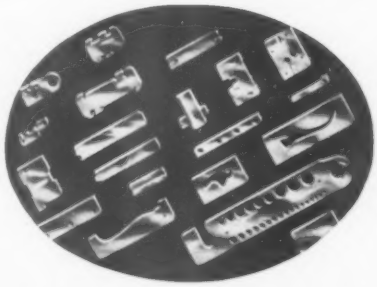
752-756 MILITARY ROAD BUFFALO 17, NEW YORK

retooling?



Then You Need STARRETT PRECISION GROUND FLAT STOCK

STARRETT GROUND FLAT STOCK



FOR PARTS LIKE THESE

TEST TOOLS	PARALLELS	TEST GAGES
DIE WORK	MACHINE PARTS	SNAP GAGES
JIG PARTS	SHIMS	TEMPLATES
FIXTURES	PUNCH DIES	CUTTERS

Buy Through Your Distributor

Get rolling faster by saving time on those countless jobs of making templates, test tools, gages, dies, small parts, pieces, etc.

With Starrett Precision Ground Flat Stock, you simply lay out the part and go ahead. No hunting for odd pieces of stock, no time lost in preliminary roughing or precision grinding.

OIL OR WATER HARDENING

Available in two types; a non-deforming, spherodized annealed, electric furnace, oil hardening tool steel and a specially made, high grade, water hardening tool steel. Both made in 18 inch lengths in widths from ½ to 6 inches and in thicknesses from a sixty-fourth to an inch and more. Each piece is rust protected, stamped for type and size, and packed in a grease-proof envelope clearly marked for quick identification and with hardening instructions.

Your mill supply distributor has it in stock or write for Ground Flat Stock Folder "E."

THE L. S. STARRETT CO. · ATHOL · MASSACHUSETTS · U. S. A.

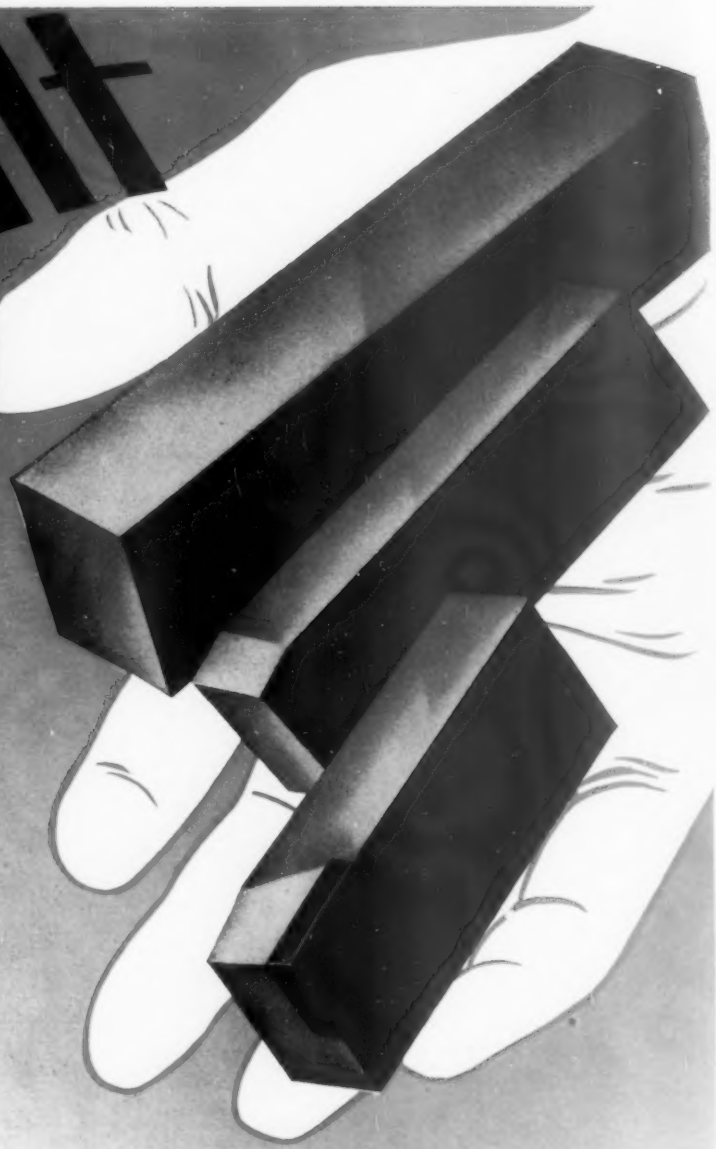
World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK

HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

Crobalt Quality



Crobalt is a hard alloy (containing principally chromium, cobalt, tungsten, vanadium, zirconium and carbon), cast in the form of tool bits and inserted milling cutter blades especially developed for high speed production. At high temperatures (up to 2000 degrees) Crobalt cutting qualities remain constant.

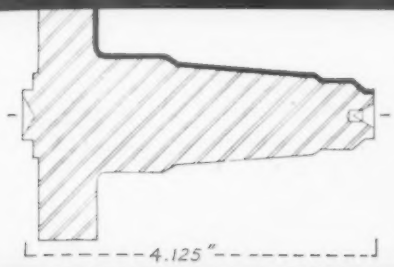
The cutting edges of a Crobalt tool stay sharp longer, and thus assure you of much greater tool life between grinds. This automatically increases production by reducing "Down-time" ordinarily required for changing of tools. Try Crobalt in your shop.

CARBIDE TIPPED
Inserted Milling Cutter Blades

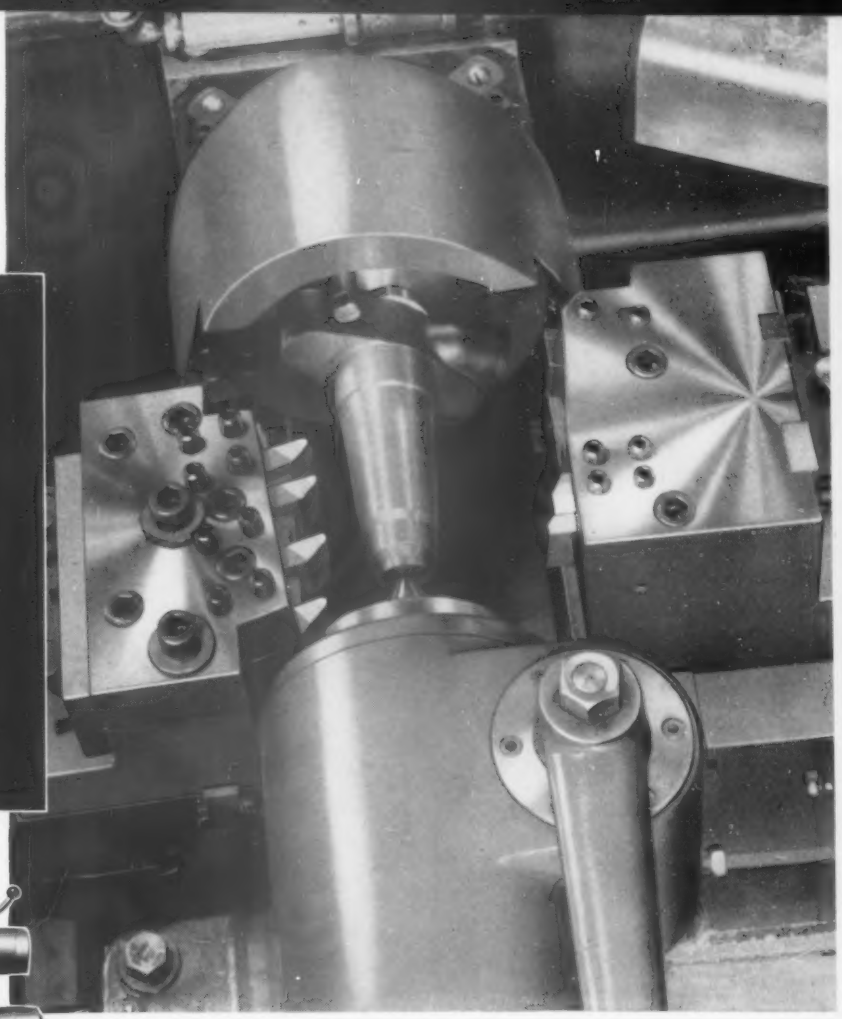
Crobalt now fabricates carbide tipped inserted milling cutter blades. Any make of tungsten carbide can be furnished. Prices for this type of blade are unusually low and the product and finish are unexcelled. We manufacture blades of all types and sizes. Send us your prints for quotation.

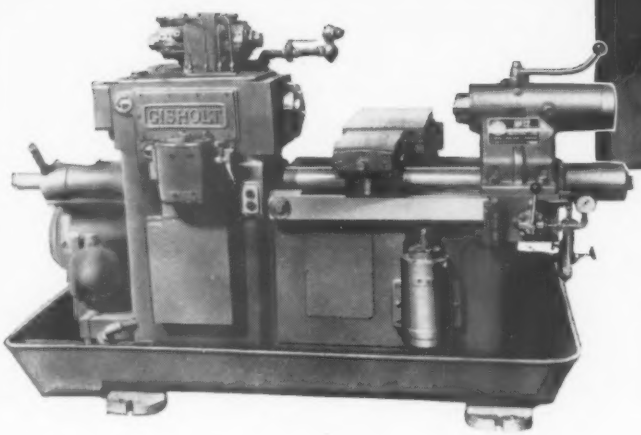
Crobalt Inc.

1351 N. Main St. Ann Arbor, Mich.



take a *Short Cut* on all cuts





with the GISHOLT *Hydraulic Automatic Lathe*

HERE'S a typical example of the ability of the Gisholt No. 12 Hydraulic Lathe to profitably combine a number of cuts in one operation.

In the machining of a type of Diesel Engine Injector Body (material—SAE 4150 steel forging, in lots of about 1000), *one* No. 12 operation is accomplishing the same work that formerly required two operations, one on each of two less versatile automatic lathes. And this work, which used to take about 5 minutes per piece to perform, is now completed in *1.5 minutes on the No. 12.*

Comparable savings are being realized on two other similar types of injector bodies, with rapid changeover, through the machining advantages of the Gisholt Hydraulic Lathe.

One reason so many jobs are done faster on the Gisholt No. 12 lies in the wide latitude of tooling arrangements it makes possible. Operations such as taper turning, forming, angular facing, constant speed radius cutting and intermittent facing can be efficiently combined with orthodox turning, facing, boring, and grooving.

Investigate the characteristics of this advanced automatic lathe that give it such remarkable earning power.

GISHOLT MACHINE COMPANY

Madison 3, Wisconsin

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and semi-round parts. Your problems are welcome here.*

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

CUT DRILLING COSTS WITH *SUPER* SOLID CARBIDE AND CARBIDE TIPPED TWIST DRILLS

Drilling with *Super* Solid Carbide drills saves money on many jobs that were troublesome with other drills. Recommended for drilling in plastics, non-ferrous metals, etc., where long wearing qualities are necessary and risk of breakage is low.

Available in fractional sizes from 1/16" to 3/4" — also in all wire and letter sizes. Many sizes in stock for immediate delivery.

WRITE FOR SPECIFICATIONS, PRICES, ETC. AND OUR RECOMMENDATIONS AS TO YOUR PARTICULAR PROBLEM.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 5210 San Fernando Rd., Glendale 3, Cal.

« Sunrise in Dixie »

IN THE RECENT WORDS of a prominent Southern writer, "*the war left the South bursting at its seams . . . full of itself and the future.*" To appreciate the full import of that statement, made after World War II, one must first review the South's economy as it was a few years ago, and then view it as it is now.

Conditions, today, are a far cry from those following the sectional strife and chaos which left Dixie to become the Nation's number one economic problem. To illustrate the long, hard road the Southern States have traveled in their "*about face*" from "*economic problems*" to "*economic opportunities,*" one has but to read Henry W. Grady's description of a late nineteenth century funeral in Georgia.

He said that a "*one gallus*" fellow was buried "*in the midst of a marble quarry: they cut through solid marble to make his grave; and yet the little tombstone they put above his grave was from Vermont. They buried him in the heart of a pine forest, and yet the pine coffin was imported from Cincinnati. They buried him within touch of an iron mine, and yet the nails in his coffin and the iron in the shovel that dug his grave were imported from Pittsburgh. They buried him by the side of the best sheep-grazing country on the earth, and yet the wool in the coffin bands and the coffin bands themselves were brought from the North. The South didn't furnish a thing on earth for that funeral but the corpse and the hole in the ground.*"

In spite of the fact that prior to 1810 the South had led the Nation in manufacturing, the Southern States produced practically nothing in finished products or goods when Grady spoke those words before the Bay State Club in Boston in 1889. The eminent journalist reported that the dead man was buried in a coat from New York, a pair of shoes from Boston, a pair of breeches from Chicago, and a shirt from Cincinnati. The only thing he carried with him as a reminder of the land in which he had lived was "*the chilled blood in his veins and the marrow in his bones.*"

Henry Grady would thrill today at the tempo of industrial development in his beloved Southland. Even a modern funeral, sad as funerals are, . . . with nails and shovels from Alabama, a tombstone from his native Georgia, a coffin from South Carolina, shoes from Tennessee, and burial clothes from the South's own textile mills . . . would give comfort to his sense of economic security and warmth to his troubled heart.

Industry expansion was moving at a rapid pace in Dixie before the outbreak of World War II. The region's manufactured commodities had increased in value from $1.5 billion in 1900, just a decade after Grady's Boston speech, to over $11 billion in 1939. Then suddenly, during the five years of conflict, $35 billion in war contracts brought new plants to the South and expanded its existing facilities. Southern steel production increased 1.2 million tons of ingots annually. U. S. aluminum capacity increased seven times its prewar level to meet war demands, with most of the raw materials and a large percentage of the finished product rolling from Southern mines and factories.

On examination, it is not surprising that the end of war production didn't put a serious crimp in the South's industrialization program. Since the surrender of Japan, more than $300 million has been added to private chemical plant expansion in the Southwest . . . to supplement the over $1 billion already spent in war years. Almost limitless resources of basic raw material such as salt, sulphur, carbon, hydrogen, petroleum and lime insure further processing developments.

At the present time, the number of manufacturing plants in the South exceeds 40,000. Commodities produced in these establishments during 1946 sold for some $25 billion. Southern farms and mines furnished most of the raw materials for these commodities. The 43 million people who live in the South, and who comprise 31% of the nation's population, provide a healthy section of the market for the products of Dixie's industries.

Coincident to the Annual Convention of the Society held at Houston, Texas, in March, several hundred members of the American Society of Tool Engineers saw at first hand a portion of the new industrial Dixie. Many of the engineers and technicians made extended tours through the industrial sections of the South . . . which are in every Southern State. The first large group of mass production specialists to assemble in Southern area, the men who composed it came away with a new and better view of the region's industrial future.

There will be more finished products industries in the South because many of these industries need the things the South has to offer. Tool engineers, industrialists, and specialists in all fields should by all means keep a weather-eye on developments below the Mason and Dixon line . . . because the industrial sun has risen again on Dixie.

W. B. Peirce

President 1947-48

By James Walker

Drawing Die Problems and Formulae

A Comprehensive Treatise Covering Advanced Design and Construction Of Simple and Compound Drawing Dies for the Mass Production Industry

Installment No. 2 of a Series

Mr. Walker

ALTHOUGH THERE ARE wide varieties of punches and dies available for use in the fabrication of sheet metal, it will be evident that there are only two main classifications. The first class embodies the cutting and blanking operations, such as blanking, piercing, trimming, shaving and shearing; the second class includes the dies that perform the bending, forming, drawing and squeezing operations.

The following dies were selected because they possess some special features that may be helpful to the reader, and should be studied before examining the actual construction of drawing dies.

Sectional Blank Die Construction

Sectional construction has many advantages for large and small blanking dies. While a large piece of steel can be machined satisfactorily with the proper equipment, a large one-piece die would certainly present a forbidding task of filing and fitting. In addition, the risks involved of ruining the work and the material in heat treatment or in use, are too great for practical purposes. Large blanking dies, therefore, should be constructed in sections.

The size of the die, however, is not the only consideration in deciding whether the construction shall be one-piece, or sectional. The sectional style is sometimes chosen to save time and to avoid tedious work, and because, usually, it results in a superior job. For example, much time and patience are required to machine and to fit a die with a thin irregular slot from a solid block, whereas the contour is readily accessible and easily worked in two or more sections. In most cases, sectional construction eliminates the difficult work of hand filing square corners and corners of less than 90° to keep them sharp. Finally, less tool steel is used for a sectional die.

"Breaking" the Die

The problem of "breaking" the die, or of deciding just where it is best to let the sections meet, is one of the most important considerations in regard to sectional dies, and the problem can be best attacked by studying the possibilities on paper. For this purpose, the templet is traced on one more piece of paper and trial breaks are made, until a satisfactory solution is reached.

The diemaker should make sectional blocks with 90° corners, whenever possible. Thus, all break lines will be either parallel or perpendicular to each other. This rule should always be observed if at all possible. Avoid breaks that result in thin, acute, angular projections. Usually, sharp corners are convenient places for breaks. If a break is to be made on a curve, the break line should be perpendicular to the tangent line. The die should be sectioned with as many straight sides as possible in order to reduce handwork.

The sizes and the positions of screws and dowels are also important in sectional dies. Most of the screw holes should be located near the cutting edge so that this side of the die block will be held down in stripping and ejecting. As dowels are used to prevent lateral movement of the die blocks, they can be placed where convenient, but located as far apart as possible.

On a small block, when the choice is between one dowel and two screws, or two dowels and one screw, always use the one screw and the two dowels. For dies blanking 1/16" material or thicker, ½" dowels should be used in the punch and the die blocks, because of the heavy pressure exerted.

All illustrations, this article, by courtesy of Southern Aircraft Corp'n, Garland, Texas.

FIG. 1.

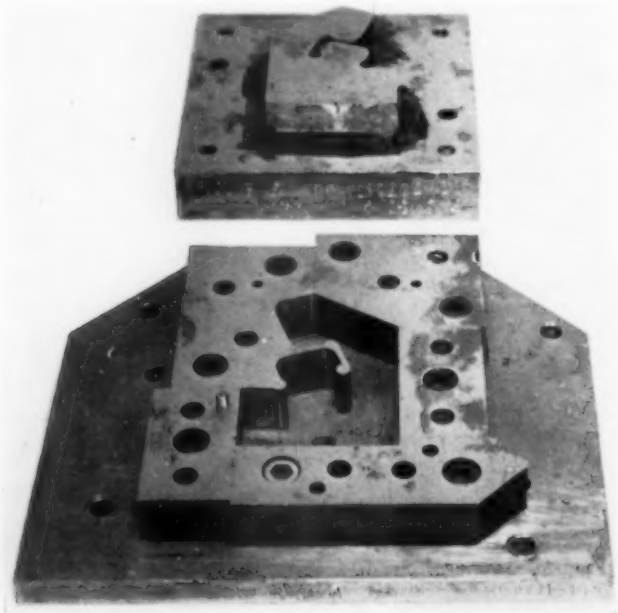
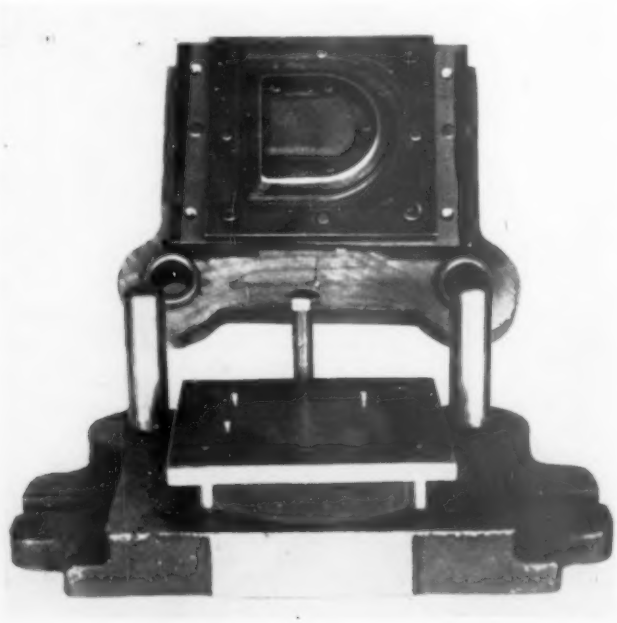


FIG. 2.



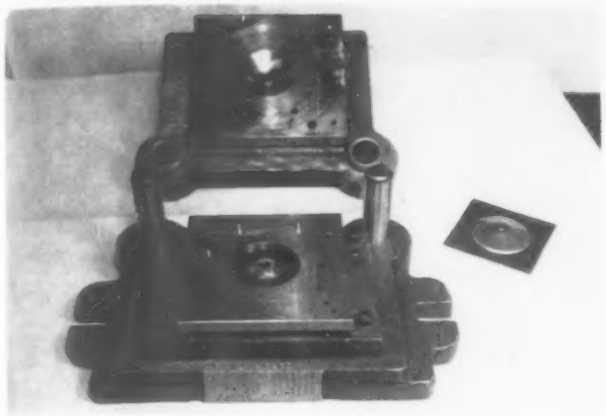


FIG. 3.

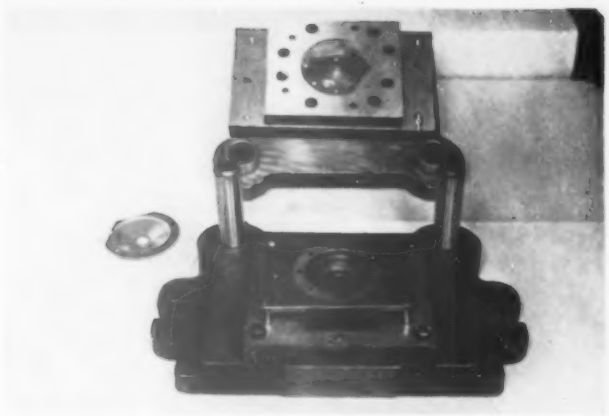


FIG. 4.

After careful study of a paper layout of the die shown in Fig. 1, it was decided to construct it with a one-piece punch of a five-piece die (also discussed, p. 72, in "Simplified Punch and Diemaking," *The Macmillan Co.*, '46). A sectional die such as illustrated requires extreme care because of the delicate, complicated hook that extends nearly all the way across the die opening. To prevent this hook from moving, and to help protect it from breaking, a small blind dowel is inserted through the die-plate and approximately halfway through the circular knob at the extremity of the hook.

Rubber should not be used for ejecting, or stripping, in a die as delicate as this. Metal strippers and ejectors made from $^3/_8$ inch cold rolled steel are recommended. The use of rubber, in small holes or around thin sections or projections, can cause breakage of both punch and die. Note that the sections of the die are mounted to a sub-plate. This eliminates drilling the die set with each hole required to mount the sections; resulting in an economical savings of die sets as, when this die becomes obsolete, it can be reworked and used many more times.

Taper Considerations

It may be of interest to explain that the die shown in Fig. 1 was constructed three times before it was successful. In each case, the construction was perfect, as far as the workmanship and the breaking of the sections were concerned. Since it was such a small die, however—2½" at its widest point—a "drop-through" type was employed. That is to say, the sub-plate and the bolster plate were sawed out so that the blank could be dropped through the bolster plate into a container. Obviously, it was necessary to taper the complete die opening its entire thickness, and also to provide clearance in the sub-plate and bolster for the blank to drop through.

The elimination of the taper was omitted in the second die; however, rubber was used for ejecting purposes and this was also responsible for breaking the hook. The third die was constructed exactly as the second die; however, a $^3/_8$" cold rolled steel stripper plate was satisfactorily employed for both the punch and the die.

Another fact worth mentioning is that a drop-through die should be employed, whenever possible, because this type of die is approximately three times faster than an ejected type—particularly in straight side presses. Inclinable presses are also about three times faster than a straight side press where an ejected type die is mounted; because the inclined position allows the blank to slide down a chute after it is ejected from the die, and eliminates handling the blanked part with each cycle of the press.

Another point worth considering, is that many shops make use of a solid bolster plate (single point presses) with various layouts of tapped holes for securing the die sets, and also the hole layouts for air cushion pins which supply the pressure to the forming and drawing dies. It is good practice to have a bolster plate as strong as possible; although, when the solid type of bolster plate is employed, it is also a very expensive one because the air cushion hole layout must be considered relative to the position of the punch shank. This is a very expensive procedure, both for the toolroom as well as the design department.

A very valuable suggestion for those who follow the above procedure is as follows: Let's suppose we have a Verson 7½ open back, or any other make press of about 50 to 100 tons. First, lay out a rectangle approximately 7" x 18" (bolster plate about 20" x 32") and saw it out. Second, lay out the standard air cushion holes and the tapped holes, then drill and tap these holes accordingly, and mount the bolster plate to the press.

In constructing the dies, screw the air cushion pins to the pressure plate of the die, then bolt a rectangular plate to the four, corner air pins. The pressure pad that does not

FIG. 5.

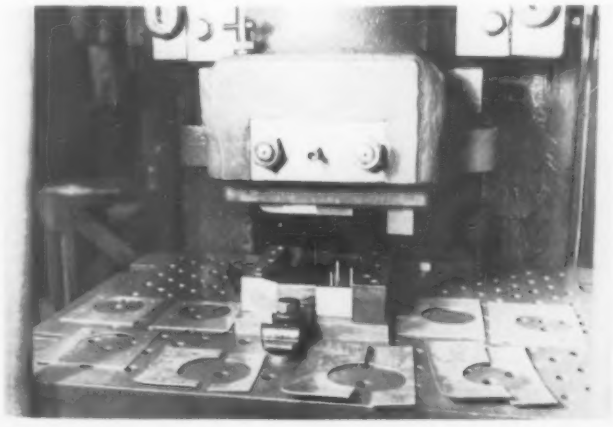


FIG. 6.

FIG. 7.

FIG. 8.

exceed 7" x 18", will obviously drop through the provided rectangular opening of the bolster plate. The punch shank and the die are secured and the die is ready for a production run without any regard whatsoever for the air cushion layout.

It is also good practice to mount large dies on four-posted die sets, and to mount medium dies to die sets that have center posts. Back guide posts are all right for the small sets—for instance, for dies up to about 12" x 22". (The above pertains to blanking dies.) Also, avoid large overhanging die sets in the blanking operations; that is to say, die sets that protrude more than 4 inches over the ram periphery.

Dinking Dies

Fig. 9 illustrates a modern and very satisfactory example of a dinking die. The punch is constructed of an easy machining tool steel (Stentor in this case), and the outside edges of the punch are tapered to about 15° to a side, to within $\frac{1}{8}$" of the cutting edge; and the angle increases here to 30° to the side. When machining, a generous radius ($\frac{1}{4}$") is ground on the nose of the end mill, and this radius ensures additional strength to the punch. The inside of the punch is rough machined to within 1/16" of the cutting edge, and the final machining is done with extreme care so as not to roll the cutting edge over.

The five pierce-punches that are located in the punch are turned in a lathe, and the taper is turned to a 15° angle to a side about $\frac{1}{8}$" long. The punch is drilled and reamed for the cap screws and dowels, and also for the pierce punches. It is then hardened. After the heat treating operation, the punch is stoned at the cutting surface, and then mounted to a sub-plate.

The die is constructed as follows: A piece of Kirksite, $\frac{1}{2}$" thick, is secured to the lower shoe by the use of stripper bolts. A cylindrical piece of rubber is cemented to the lower shoe beneath the Kirksite plate. The rubber disc is clamped in place by the Kirksite plate and the stripper bolts, as illustrated in Fig. 2. The bolts shown in the rear (Fig. 2) have lock washers and nuts so that the shut-height can be adjusted when necessary.

In actual production, the Kirksite plate was found to be more satisfactory than the usual hard wood block. The rubber aids in keeping the punch and die parallel, and can also be adjusted if necessary. The three locating pins are press fitted in the Kirksite plate, and are obviously used for nesting the part.

The following illustration is to point out an important factor when confronted with such an operation as draw (or form) and trim, and pierce.

Where parts are to coordinate with a component part, it is always good judgment, where applicable, to perform the drawing operation first and the piercing and trimming operations in succeeding order. The reason for this is because relation of the chordal distances between the holes, and the distances between the holes and the edges of the part, are of paramount importance.

Shallow Draw and Trim*

The illustrations shown in Figs. 3 and 4 called for a precision location of three of these parts, side by side at assembly. There were 21 holes to coordinate with a component part; 5 holes located in the flange and 2 half holes located at the edges of the part. When assembled, the 21 holes mated with the top of a forging, 15 of the holes were in the flanges and the 2 half holes of one part mated with an additional 2 parts alike. It is significant, then, that to

*Literal quotation from Ch. IX of the book, "Simplified Punch and Diemaking," written by the author and Carl C. Taylor; published by *The Macmillan Co.*, 1946.

FIG. 9.

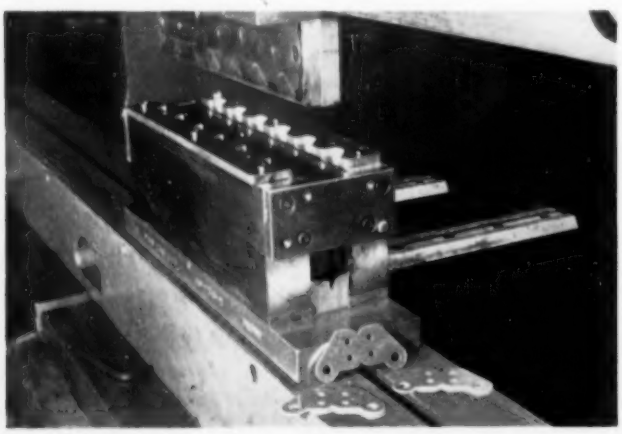


FIG. 10.

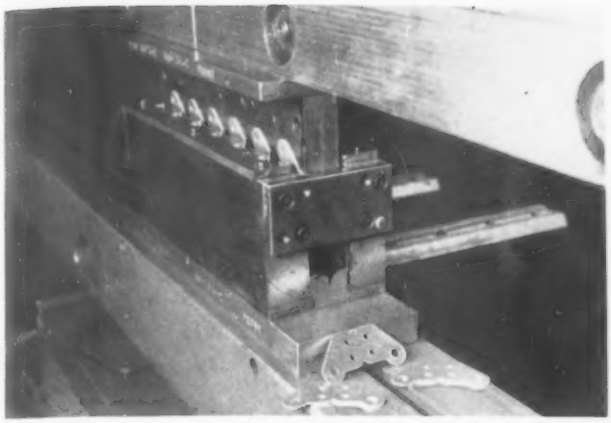


FIG. 11.

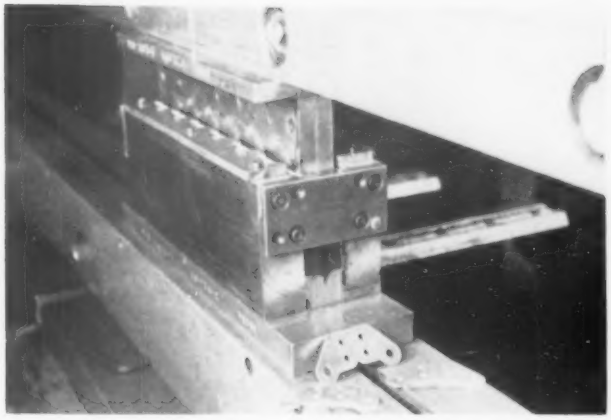


FIG. 12.

attempt a combination blank and pierce first, would have been very foolish as the succeeding forming operation would no doubt change the precision chordal distance that was required of the pierced holes.

Fig. 3 shows a die combining a forming operation with a piercing operation. Compared to the common type, this die is inverted—that is, the male part of the die is on the bottom, and the female part is on top. The male forming punch is mounted rigidly to the lower plate and contains the hole for the piercing operation. Surrounding this stationary part of the die is a pressure ring, which is spring-loaded in much the same manner as stripper plates used with compound blank and pierce dies. The ring rides just above the highest point of the stationary piece.

In the upper part of the die, the small piercing punch is rigidly mounted to the die plate to keep it in correct alignment with the piercing hole. However, the concave forming die, surrounding the piercing punch, is spring-loaded and thus acts as a stripper for this small punch.

In operation, a small square of metal is brought against the three locating pins. As the die descends, the two flat surfaces first contact the square sheet of metal and hold it securely while the forming and piercing operations are performed. Both spring-loaded die members collapse as the part is being formed, and when this operation is completed, the metal comes into contact with the piercing punch—which extends approximately 1/16" beyond the surrounding die—and the hole is pierced. As the die ascends on the last half cycle of operation, the formed and pierced part is automatically stripped from the piercing punch and is free to be removed from the pressure ring.

Fig. 4 shows the die for the last operation. This die not only trims the formed part and pierces five extra holes in its flange, but also flares the center hole. In general makeup, it is exactly like an inverted compound blank and pierce die. The punch is on the bottom and the die is on top. Rubber-actuated stripper and ejector plates are used for releasing the trimmed scrap and the finished part.

The punch, mounted to the lower plate, is recessed to accommodate the formed contour of the part and has in its center a hole into which the part is flared. Mounted in the center of the die is a stepped plug or flaring punch, surrounded by a shoulder extending from the ejector plate. This shoulder serves to strip the part from the flaring punch and prevents distortion since, in length, it is exactly the same depth as the formed recess.

As the cycle of operation progresses, the pilot or the small end of a flaring punch enters the center hole that has been previously pierced and corrects any slight mislocation of the part. The blanking and piercing operations follow immediately. As the ejector plate is forced into the die opening, the stepped shoulder on the flaring punch contacts the edge of the center hole and flares it. As the ram ascends, the ejector frees the part from the die cavity and from the flaring punch, while the stripper pushes the scrap from the punch.

Forming and Parting Dies

The forming and parting die, as its name implies, forms a piece of metal previously blanked and pierced to a desired shape, and then cuts it in two or more individual parts or pieces. Special tools permit production in multiple, minimize distortion, and simplify operations.

Various conditions and requirements dictate the advisability or inadvisability of constructing a die of this type. One requirement that might indicate the practicability of such a tool would be the need to reduce the number of operations in the production of parts when they are desired in quantity. A condition that would suggest combining two

FIG. 13.

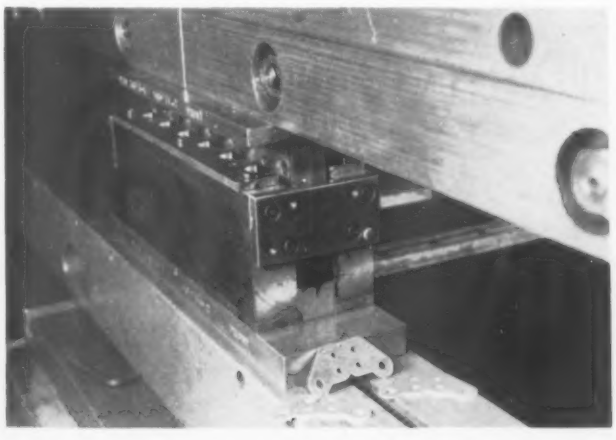


FIG. 14.

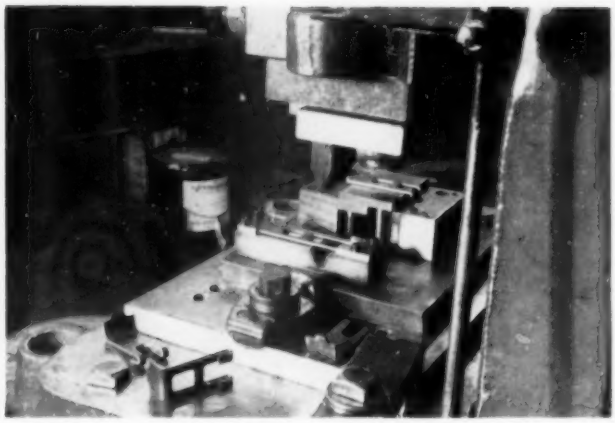


FIG. 15.

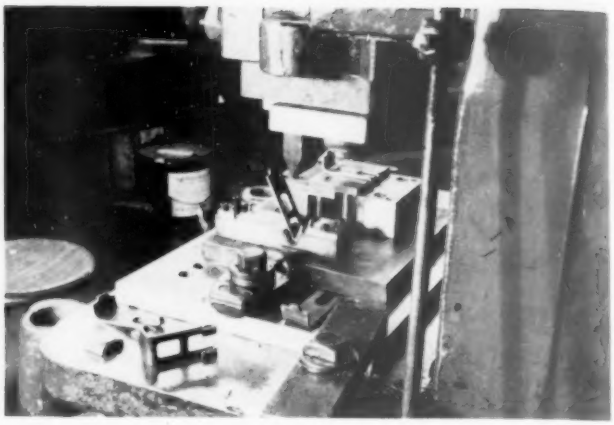


FIG. 16.

parts for the forming operation would be one in which an undesirable distortion of the parts resulted during the forming operation where each piece is formed separately.

Figures 5, 6, 7 and 8 show the different stages in the production of two parts beyond the allowable limits imposed. In Fig. 5, several parts of two different widths are shown on the bolster plate of the press, in the original flat blanked and pierced condition, and also completed in the formed and parted state. Both parts are formed and parted simultaneously.

Punch and die construction is sectional, with two leading punch and die blocks hardened and ground to fit, which perform the cutting operation. In other words, one section of the punch leads the other section by metal thickness; this is also true of the die sections. The material thickness in this case was 0.065-inch SO Alclad.

Fig. 6 shows the three locating pins and the position of the part about to be formed. Fig. 7 illustrates the descent of the punch to a point where the part has been almost completely formed and the parting operation is ready to take place. Fig. 8 illustrates the complete forming and parting operation. This particular type of die is very important where both left and right hand parts are required.

Die for Press Brake

Figs. 9, 10, 11, 12, 13 and 14 illustrate the construction of a forming die for use on a press brake which forms and parts twelve pieces with each cycle of the press. After forming and parting, these pieces become left-hand and right-hand parts.

The principles of the punch and die are almost identical with the one previously described. In this case, however, a spring-actuated pressure pad rides between the two die blocks, holding the parts being formed as well as ejecting them after the operation is completed. The punch and pressure pad are of sectional construction, and are stepped metal thickness as in the die previously described.

In Fig. 9, the blanked and pierced parts and the punch and die are aptly illustrated. Fig. 10 shows the six parts located in their nests. Figs. 11, 12 and 13 show the press descending to the bottom of the stroke where the parting operation takes place. Fig. 14 shows the original six pieces completely formed and parted.

Two-Stage Forming Die

Figs. 15 and 16 illustrate a typical example of how a great number of parts, which require two operations, can be formed by one die that has two stations. Consequently, a die set, a setup, a press and an operator's time can be eliminated by this type of construction.

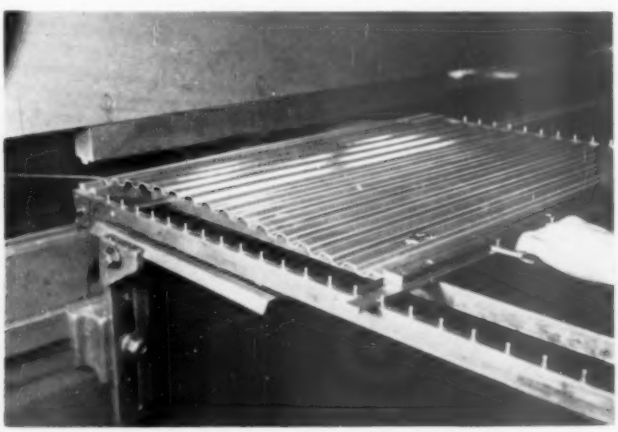
Fig. 15, shows a part nested for the first operation, and also a part that has been completed at the first stage and now located at the second stage. Fig. 16 illustrates exactly what takes place with each cycle of the press, and also shows several views of the formed parts. One important consideration is that the die set in this case has been disregarded, hence, reliable press operators or die setters must be available to ensure perfect alignment of punch and die.

Another important factor to be discussed at this point is as follows: It is evident, in the second station, that the part that is previously formed is carried to the bottom of the stroke by the downward force of the press. The part is supported by a pressure plate which, in turn, is supported by a cushion of air supplied by an air cushion beneath the bolster plate of the press. At the bottom of the stroke the part is "spanked" into the required formation.

It will be noted that, since the space between the formed hook is very small (in this particular case 3/16") there is a brutal impact of the pressure plate from both the upper

FIG. 17.

FIG. 18.



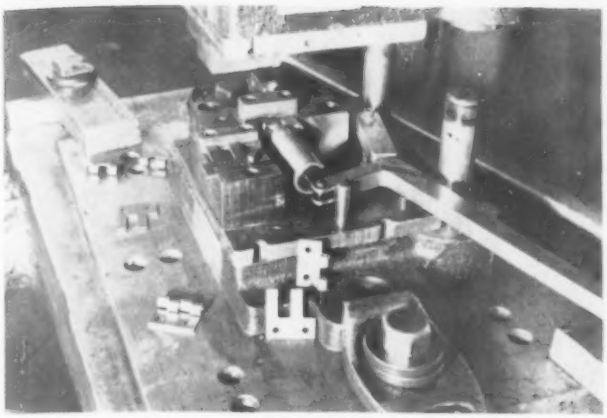


FIG. 19.

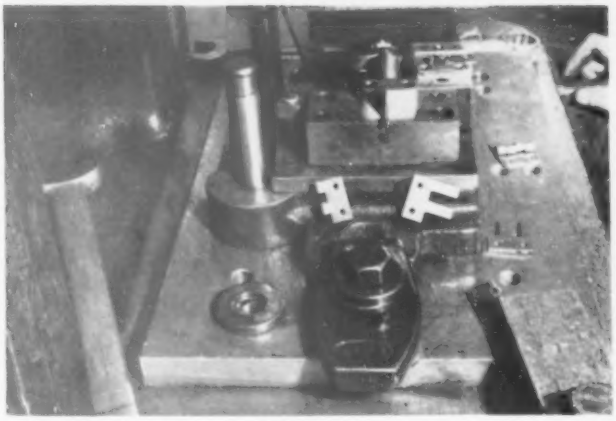


FIG. 20.

portion or the punch and the under side of the pressure plate, hence, the pressure plate should be constructed from a shock resisting steel (in this case Solar) to prevent cracking or breaking the pressure plate. Likewise, the forming punch in the first stage should also be constructed from a shock resisting steel. The other component parts can be constructed from the ordinary easy machining grades of tool steels, such as Stentor.

Corrugations are usually employed because of the stiffness and strength they supply to a flat sheet. Sometimes it becomes necessary to form corrugations that must be accurately spaced in relation with each other.

The illustrations shown in Figs. 17 and 18 are typical of such an example. The corrugations in this case were 36" wide, and the total length of the combined number of corrugations was 48". The tolerance allowed for this particular job was only 1/16" throughout its entire length. The die was constructed to run in the press brake.

The construction of the dies that were used is as follows: Two bars were jig-bored and dowels were driven in place as shown. These accurately spaced doweled bars were then mounted to the sides of the die. The first part of the operation was to feed the part through the die extending about three inches beyond, and the first corrugation was formed. A clamp bar secured the flat edge of the sheet as shown, and four cap screws held the sheet in place.

Operation of Press Brake for Corrugating

Two handles were provided for the pressman at the rear of the press. The pressman then placed the tongues of the tie-bar up against the first two pins (obviously, the tongues were positioned toward the sides of the pins near the rear pressman) and as the second stroke of the brake was performed the material, being pulled downward into the die, drew the metal up until the tongues of the tie-bar struck the edges of the forward pins. As a result, a certain amount of elongation takes place until the completed corrugation is formed. With the forming of each additional corrugation, the tongue is placed one space further back, and with each stroke of the press the elongation of the material is controlled alike by the chordal-distance of the locating pins. The particular part did not vary over 1/32" in its entire length.

Two-Stage Hinge Die

Figs. 19, 20, 21 and 22 illustrate a very simple method of constructing a two-stage hinge die. Fig. 19 shows the flat blank positioned in the nest of stage No. 1 which forms a slight curl as shown in Fig. 20. Fig. 21 shows the press at the bottom of the stroke and the full curl that followed the contour of the die. Fig. 22 illustrates the complete cycle and also the various stages of the parts from the blank to the final assembly.

There are several methods for fabricating a hinge; however, the above method is not only a very good one but also an inexpensive one. Some hinge dies are cam actuated—nevertheless a more intricate construction and a very expensive one. Note the small slot in the punch at the second stage of operation; this slot ensures a more uniform roll than would just the flat punch. A simple ejecting finger was mounted to simplify unloading the finished piece, as shown at stage No. 1 in Fig. 19.

The heights of the punch and die in the second stage are also used as the stop blocks. To determine the shut-height, set the press high at the first stroke, and adjust downward a little each time until a satisfactory roll is achieved; then the heights can be obtained either by shimming the punch or the die as the case might be.

End of Part 2, this series. Installment No. 3 will follow in June The Tool Engineer.

FIG. 21.

FIG. 22.

By J. H. Dunaway

Application of Geophysical Instruments to Oil Prospecting*

Oil Well Prospecting is Now a Science which Demands Highly Developed Instruments for Location of Fields

FROM AN ECONOMIC viewpoint, precision instruments play an important role in geophysical prospecting for oil. Their application is important, not only because of the magnitude of the operation itself, but because of the results in maintaining the supply of petroleum for the industries of the country.

This paper will describe the basic geophysical methods of prospecting, the organization of a geophysical department, and the methods of designing and constructing geophysical equipment employed by a typical geophysical organization.

J. H. Dunaway **is Senior Research Geophysicist with Humble Oil & Refining Co., Houston, Texas. Born in Ft. Worth, he was graduated from the University of Texas with degree B.S. in Electrical Eng'g. After a brief employment with the Houston Lighting & Power Co., Houston, Texas, he joined the Humble organization in 1933, engaging in seismograph field operations. He became Research Physicist in '42, and is now in charge of equipment design. He is a registered professional engineer, State of Texas, and, among other technical and scientific organizations, is a member of the Society of Exploration Geophysicists.**

Petroleum is found only under certain rather special conditions, where the geological history of the area has been favorable. The favorable areas can sometimes be located by physical measurements made at the earth's surface, since these measurements are affected by variations in the physical properties of the subsurface materials. Unfortunately, reservoirs are frequently many thousands of feet below the surface of the earth, and the variations in the physical properties are usually small.

*Resume of a paper, by the author, at the '47 Annual Meeting, A.S.T.E., held at Houston, Texas.

Reflection seismograph operation. "Shot-point" scene.

Moreover, variations due to inhomogeneities in the earth at shallower depths also affect measurements made at the earth's surface. For this reason, it is necessary to make measurements with a high degree of precision. Thus, in gravity prospecting, variations in the acceleration of gravity of a few parts in ten million may indicate a valuable structure and, in seismic prospecting, ground motions of a millionth of an inch, and variations of time of a few thousandths of a second are recorded.

The most widely used geophysical method is the reflection seismograph. In this method a charge of dynamite, usually between 2 and 50 lbs., is exploded in a hole 30 to 100 ft. deep. This explosion causes elastic waves to travel through the earth. At each interface where the elastic properties of the earth's material change, some of the energy is refracted and some is reflected back to the surface. By determining the velocity with which these waves travel through the earth, and by measuring the time for a wave to travel from the shot down to a particular bed and back to the surface, it is possible to determine the depth of that bed.

Equipment Highly Specialized

Since many of the petroleum reservoirs have the form of an inverted bowl, they may be located by measuring the depth to a number of points on them. The shallowest points are, of course, the desired points. The problem of seismic prospecting is complicated by the multiplicity of possible paths by which the waves can travel from the shot to a point on the surface. This results in the ground motion at any surface point being very complex. It is made up of a large number of transients, whose frequency spectra depend upon the length of the path and the elastic properties and thicknesses of the various beds through which the waves have traveled. The amplitude of the ground motion may vary over the useful recorded time by a factor of many thousands. These conditions require the seismic equipment to be highly specialized.

Reduced to its basic elements, a set of seismic equipment consists of a number of seismometers, or pickups, a set of amplifiers connected to these pickups, and a recorder. The pickups translate the earth's motion into electrical currents.

Portable reflection seismograph equipment. Transported by boat in the swamps of Louisiana.

The amplifiers amplify these electrical currents. The amount of amplification must be varied automatically, so that the outputs of the amplifiers remain fairly constant, even though the inputs vary by a factor of several thousand. The amplifiers must have a frequency response which discriminates in favor of transients having frequency spectra corresponding to waves which have been reflected from the bed of particular interest. The recorder makes a record on photographic paper of the outputs of the various amplifiers, as well as a time scale, and other necessary information.

Occasionally, new oil fields are discovered alongside concrete highways, but more frequently they are discovered in swamps, on sandy waste lands, or even in watercovered areas. For this reason, the mechanical design of seismic equipment must be extremely rugged, and yet the equipment must be portable either by truck, marsh buggy, boat, or on a man's back. The delicate and sensitive electrical circuits must be protected from the ill effects of humid climates.

Variations to One Ten-millionth Measured

In gravity prospecting, variations in the acceleration due to gravity from place to place on the earth's surface are determined. This is done by weighing a small mass with a very precise spring balance. When the mass is over a body of material of lower than average density, such as the salt in a salt dome, the attraction of the earth for the mass is less than normal and its weight is decreased. Such a spring balance is called a gravity meter.

No attempt is made to determine the absolute weight of the mass, but variations of the weight of the order of one part in ten million are measured. This is a relative accuracy of higher order than would be required to determine the change in weight of an automobile when a five cent piece is placed in it! This accuracy must be maintained over a period of weeks, since it is necessary to compare results over a wide region in order to locate the most favorable areas in this region.

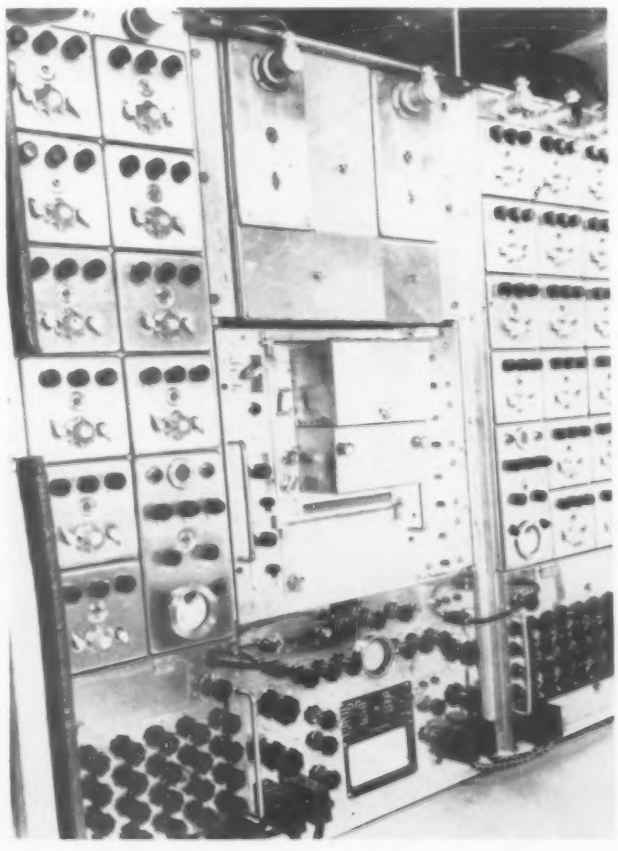
In making these measurements, the gravity meter, like the seismic equipment, must be carried over terrain of widely varying character and by any suitable method of transportation. The meter must be capable of withstanding the rather rough treatment it necessarily receives. It must also be capable of maintaining its accuracy over wide variations of temperature.

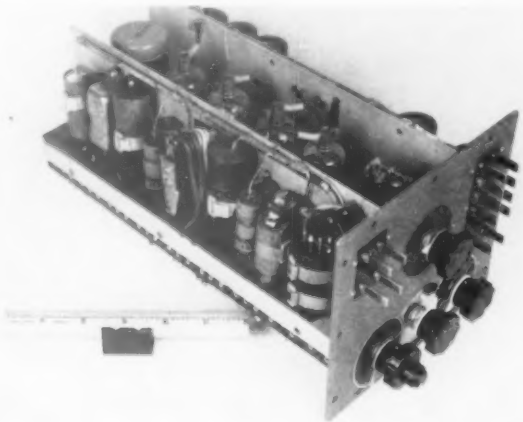
Equipment Custom-Built

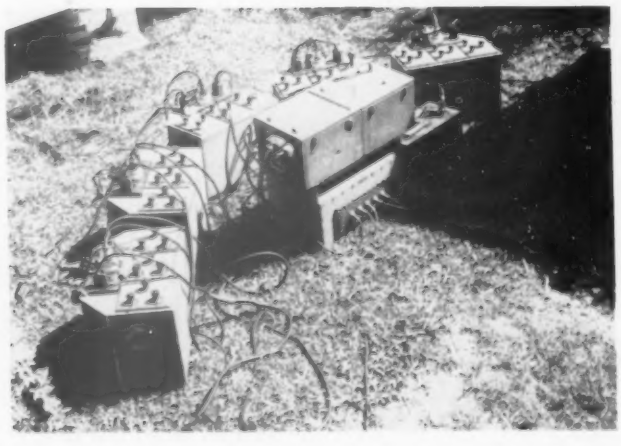
Geophysical work is carried on either by company operated crews, or by crews supplied by a comparatively limited number of contractors. A few companies make geophysical equipment for sale, but nearly all of the equipment is designed and constructed by the actual user. This is done largely for two reasons: First, the geophysical art is still rather young, and rapid changes in equipment are still being made so that close liaison among field parties, the research and design groups, and the manufacturing shops is essential, if one is to maintain a favorable competitive position. Second, the requirements which the equipment must meet in different areas, either because of different geological conditions, or because of the problems introduced by the type of terrain, vary widely. So, again, close liaison is essential if the operating crew is to receive suitable equipment promptly.

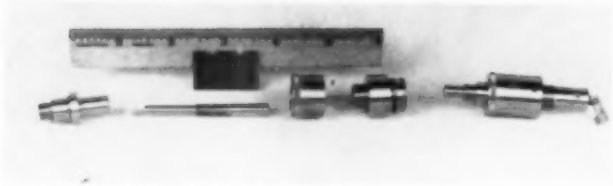
A typical geophysical manufacturing shop has very diverse equipment and workmen. Nearly all phases of the manufacture are handled within this single shop with only highly specialized operations, or operations involving very heavy equipment, being sub-contracted. A typical geophysical shop will have watchmakers and watchmaking equipment at one extreme, and blacksmiths and welders and their equipment at the other extreme. Thus, Humble Oil and Refining Company in its geophysical shop has the following equipment:

At RIGHT, reflection seismograph amplifier. BELOW, interior of recording truck, showing reflection seismograph equipment. At LOWER RIGHT, reflection seismograph operation. Typical "setup" of portable equipment.

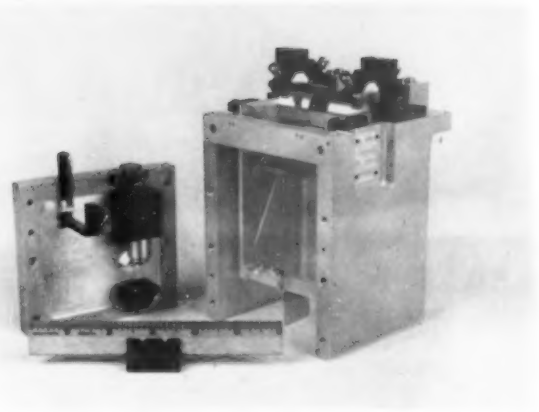








ABOVE and at RIGHT, precision gravity meter parts.



Eighteen lathes ranging in size from a 16½" Monarch tool room lathe down to two jeweler's lathes; and 8 milling machines from Brown and Sharpe No. 2's down to small index mills, including a Gorton 9J with duplicating table.

In addition to these, there is a Gorton 3U engraving machine, a 12" shaper, some 20 drill presses ranging from large floor models down to sensitive jeweler's drill presses. Grinding equipment includes a large surface grinder, large and small tool grinders, in addition to numerous bench grinders. A Rockwell hardness testing machine is also included.

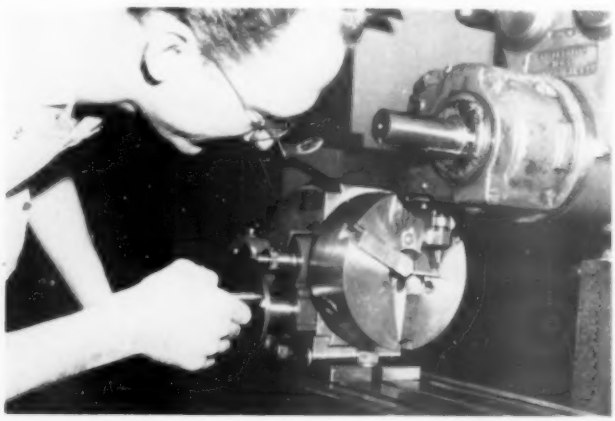
Press equipment consists of a punch press, a 10-ton hydraulic press and a 100-ton plastic molding press. Two power hack saws and metal cutting band saw and DoAll contour saw, a filing machine, four disc and belt sanders, and a buffing machine are available. The sheet metal working equipment consists of large and small shears, and bending machines. Besides, there is welding equipment, a forge, woodworking saw, jointer and shaper.

This diversification of equipment and skills is partly the result of the fact that, at the time geophysical shops were set up, many of the specialized services were not available in the local areas. It is also motivated somewhat by the advantage of maintaining direct control over all phases of the operations. It is economically feasible because the cost of the equipment, even though high, represents a very small fraction of the cost of the final exploration activities, and because the quality of the work performed by the equipment is extremely important since, on the basis of this work, very large investments in leasing and drilling operations are made.

Because most of the equipment is manufactured in small lots, only limited special tooling is done, much of which is for the sake of maintaining accuracy and interchangeability, rather than economy in production.

Manufacture of precision gravity meter parts. Contour milling.

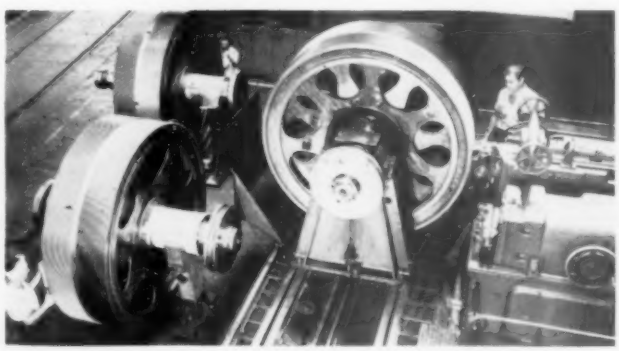
Precision milling in manufacture of precision gravity meter parts.



Gear Shaving Ups Production and Improves Surface Finish

TAKING A LESSON from automotive and aircraft gear finishing techniques, marine-gear engineers have adopted gear shaving to provide a better finish on the teeth of the huge gears used in steam turbines. The idea of taking a thin slice—a few thousandths of an inch—from the surfaces of gear teeth, after they have been formed by hobbing, has been applied by Westinghouse engineers, at the South Philadelphia Steam Turbine Division, to the finishing of 8 ft. diameter gears installed in aircraft carriers and capable of transmitting several thousand horsepower.

After considerable development, to suit the method to such large gears, it has become possible to obtain full-face contact without recourse to lapping or other means. The gear shaving technique removes feed marks and other surface imperfections; furthermore, hobbing speeds and feeds have been stepped up as much as 50 per cent without sacrificing accuracy. However, a slightly rougher finish resulted; but this was corrected by shaving which, in the final analysis, resulted in a considerably finer finish than the best hobbed surfaces at the previous slower speeds and feeds.



By C. J. Linxweiler

Recent Developments in Crush Grinding Thread And Annular Forms*

Crush Dressing Produces Complementary Form in the Wheel Which in Turn Duplicates the Original Shape

CRUSH TRUING OF GRINDING wheels has undoubtedly been one of the major industrial arts to be rediscovered and actively put to use in the last decade.

"Crush" had no meaning in the metal working bibliographies of the year 1940, but today "crush" is a common and frequently used word to signify the rapid and precise transfer of a contour to a grinding wheel from a metallic roller.** To understand the crushing principle more fully we must first study the makeup of the vitrified bonded grinding wheel that makes the process workable.

A graduate of Ohio State University, *Carl J. Linxweiler* spent a number of years in radio and electronics engineering prior to joining the Sheffield Corporation. For the past several years, he has been successively associated with, and responsible for the development and application of a wide variety of Sheffield machine tools. He is particularly versed in precision form and contour grinding by both crush truing and microform grinding methods.

The bonding material holding the cutting grits has a composition similar to glass. When the wheel is at rest or rotating slowly, the bonding material is easily fractured under a compressive load. When the wheel is revolving at grinding speed the centrifugal forces tend to strengthen the bond, to the extent that the grit is held firmly while removing chips from the work.

Therefore, if we allow a slowly rotating wheel to drive a roll on which a profile has been established, and at the same time apply radial pressure, the grits of the wheel will break away from the bond and the wheel takes the reverse of the profile on the roll.

Simplest Method for Complex Contours

Crush grinding has proved to be the simplest dressing procedure for a complex wheel contour. It is only necessary to produce in a roll the profile or contour desired in the work and then use that roll to produce a complimentary form in the wheel, which in turn duplicates the original desired shape in the workpiece. The machine change from one part profile to another is extremely simple, involving only a change of rolls and the presentation of a fresh wheel surface for truing. This reduces the setup time, in comparison with diamond trued grinding of one element at a time, or the maintenance of a complex diamond truing device. It also greatly reduces job change cost and makes the crush grinding of small order quantities most practical.

The advantages cited above make the crushing process of grinding most practical for common production grinding problems which have been the subject of recent tests and experience. Crushing, for example, has permitted thread grinding to compete economically with planetary helical form milling and multiple thread milling as a high production method.

For example, the reciprocating drive worm, Fig. 1, at the end of the armature shaft of a standard oscillating electric fan can be *plunge ground* from the solid, on a Sheffield Precision Thread Form Grinder.

*This paper was originally scheduled for presentation at the A.S.T.E. 1946 Semi-Annual Meeting, Pittsburgh, Pennsylvania.

**See "Crushed Wheel Grinding," by J. C. Wilson in December, 1946, *The Tool Engineer*. Also, "Crush Form Thread Grinding—British Method," by L. H. Rhodes, in October, 1946, *The Tool Engineer*.

FIG. 1.

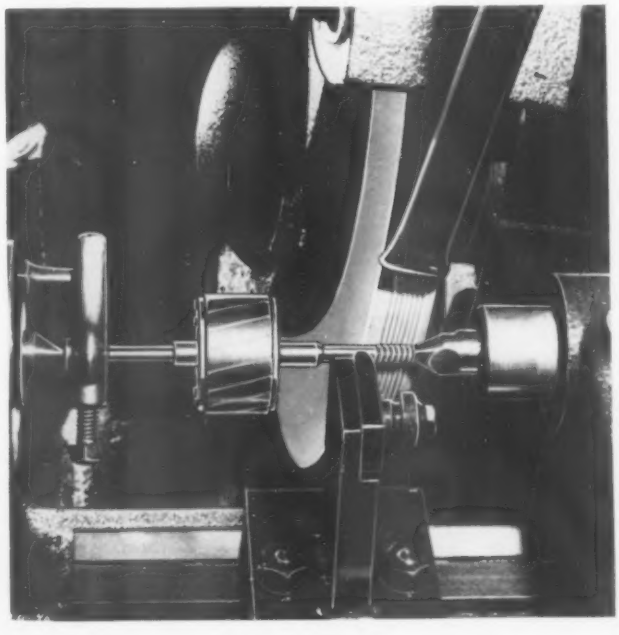
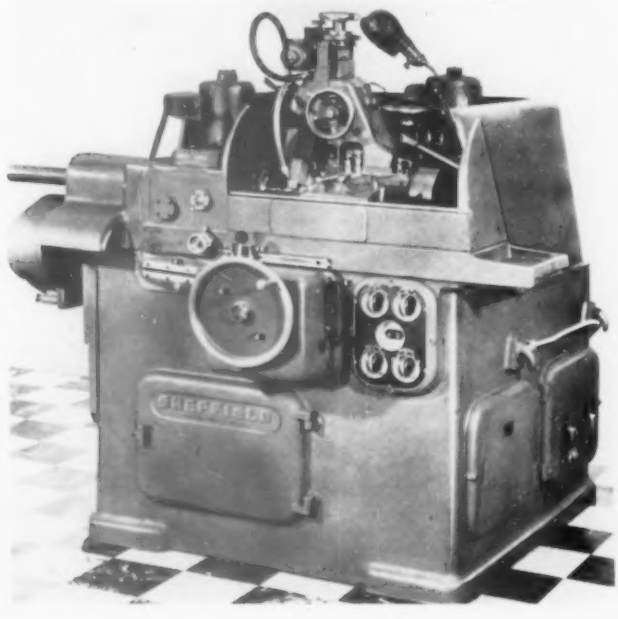


FIG. 2.



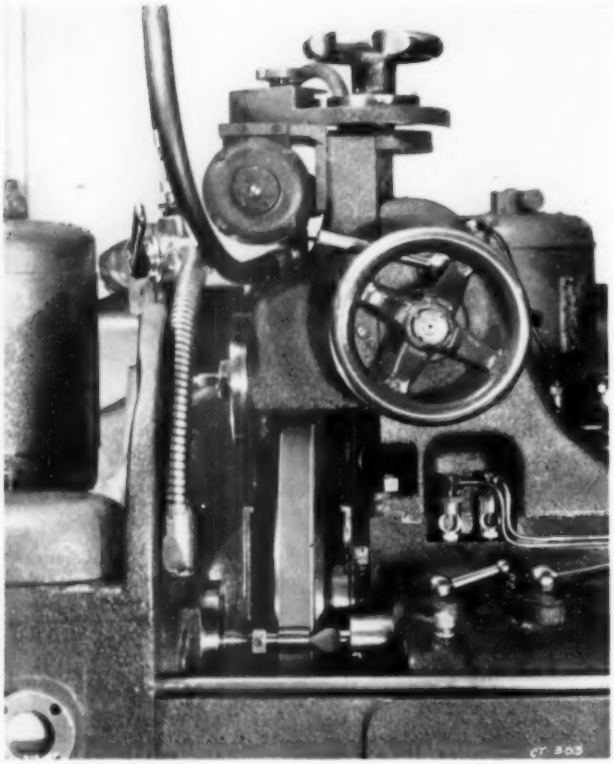


FIG. 3.

This worm is of .312" outside diameter, 38 diametral pitch, 14½° pressure angle, modified with .046" radius at the crest of the tooth form. The worm is plunge ground in two revolutions of the work and at a floor-to-floor rate of 120 parts per hour. The wheel is dressed after 150 pieces have been ground, and 5000 pieces are produced before the crusher roll requires resharpening.

The grinding wheel is of 180 grit *K* hardness vitrified bond. The dressing cycle with the semi-automatic powered dresser takes less than a minute. The first imperfect thread convolution is removed automatically during the thread grinding cycle, and without additional time.

The customer, by going to crush plunge thread grinding has increased his production by 85% over previous milling methods and has a better finished and more uniform product which, in this particular case, means a quieter running fan and greater wearability.

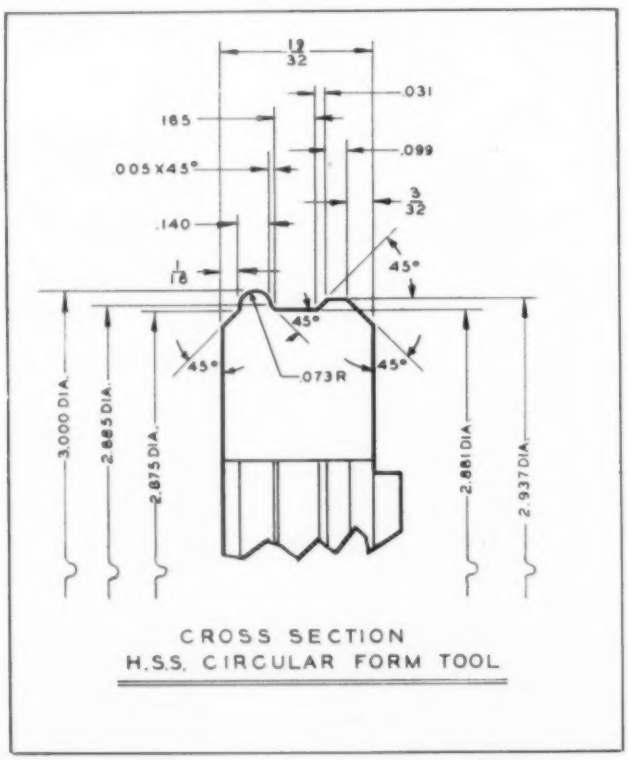
Details of the Machine

Before reviewing additional data on crush grinding, it may be desirable to briefly describe the machine on which the work is produced.

The Sheffield Thread and Form Grinder, Fig. 2, as its name indicates, may be used for grinding either annular or helical forms. When used as a thread grinder, the table traverses in correct relation to the turning of the work by means of a lead screw and nut. Pitch changes are made by selection of correct gear combinations. For annular form grinding, however, the table is held stationary in relation to the wheel.

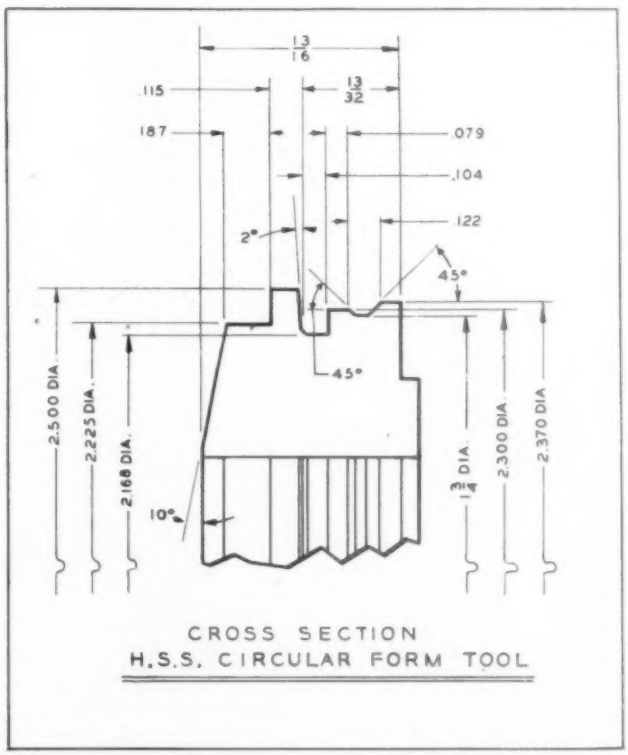
The dressing mechanism for either thread or annular form grinding is mounted on the wheel head spindle housing, Fig. 3. The crusher arbor is mounted on a slide controlled by a rack and pinion for rough positioning and a micrometer screw for feeding the crusher roll into the wheel. A fractional hp motor engages the micrometer screw through a

FIG. 4.



	Hours
Layout	1.5
Grind Crusher	3.5
T.F.G. Setup	.5
Rough Grind 6 Tools	1.5
Finish Grind 6 Tools	1
Micro-Form reoperation	2
Total Time	10
Time per tool	1.67
Former grinding time	5.5

FIG. 5.



	Hours
Layout	2
Grind Crusher	5
T.F.G. Setup	.5
Rough Grind 6 Tools	1.5
Finish Grind 6 Tools	1
Micro-Form reoperation	3
Total Time	13
Time per tool	2.17
Former grinding time	6

gear reduction mechanism and insures a constant rate of crusher infeed—a very important point, in prolonging both wheel and crusher roll life.

In dressing or truing the wheel, an electrical timer controls the depth of infeed and stops it at the required point. It also permits the wheel to rotate several additional revolutions at slow speed, after depth of form has been reached. This corrects any out-of-round condition.

Manufacture of Circular Form Tools

With this explanation, the writer would like to discuss specifically annular crush form grinding as applied to the manufacture of circular form tools.

Figs. 4, 5, 6 and 7 illustrate circular form tool profiles to be made by crush grinding. Immediately beneath each illustration is the complete time study for making 6 each of these tools.

For example, in Fig. 4, we show 1.5 hours for making the 50-1 layout for a Sheffield Micro-Form Grinder; 3.5 hours for finish micro-form grinding the crusher roll; 1.5 hours for roughing 6 tools; 1.0 hours for finish grinding these tools up to the point where crush dressing and grinding ends and conventional single element grinding is necessary to obtain the .005" x 45° step.

By using crush grinding we finish the 6 tools in 1.67 hours each as against 5.5 hours each, the former conventional grinding time.

The same process may be used for manufacturing quantities of working crusher rolls. The handling of repeat orders on these, or circular form tools is greatly simplified and the time still further reduced, as the master crusher and the formed wheel may be stocked in the tool crib until needed.

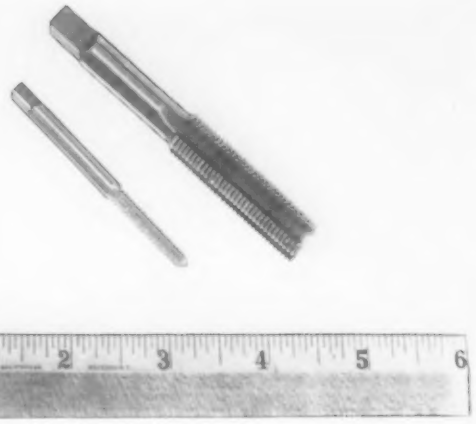


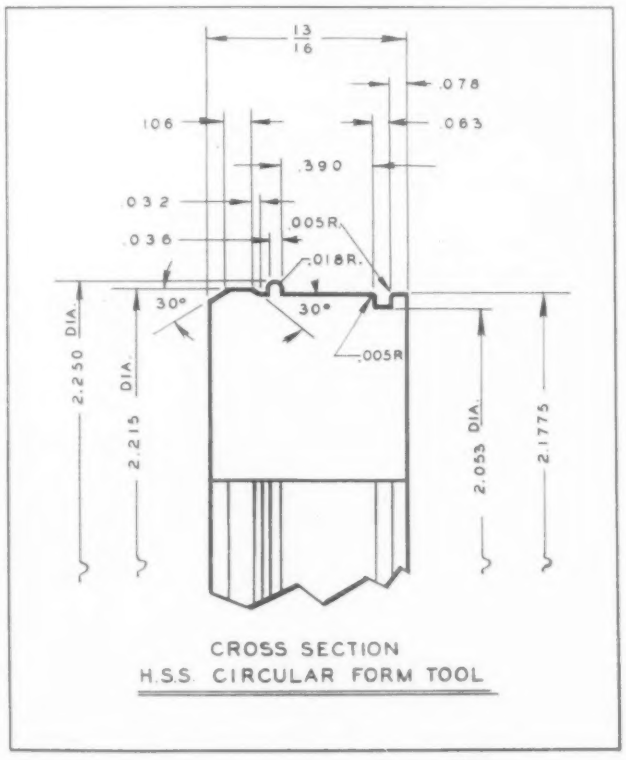
FIG. 8.

The production figures are then reduced by the time allowed for making the master crusher.

Commercial production thread grinding with a multi-rib grinding wheel is now ordinarily done without any use of helix angle setting of the grinding wheel. This simplifies the setup for any particular job and assures that the original lead accuracy of the crusher roll will be duplicated in the work. For the production of Class 3 tolerance in commercial threads, where ¼ pitch minimum root clearance is permissible, this method has proved very satisfactory.

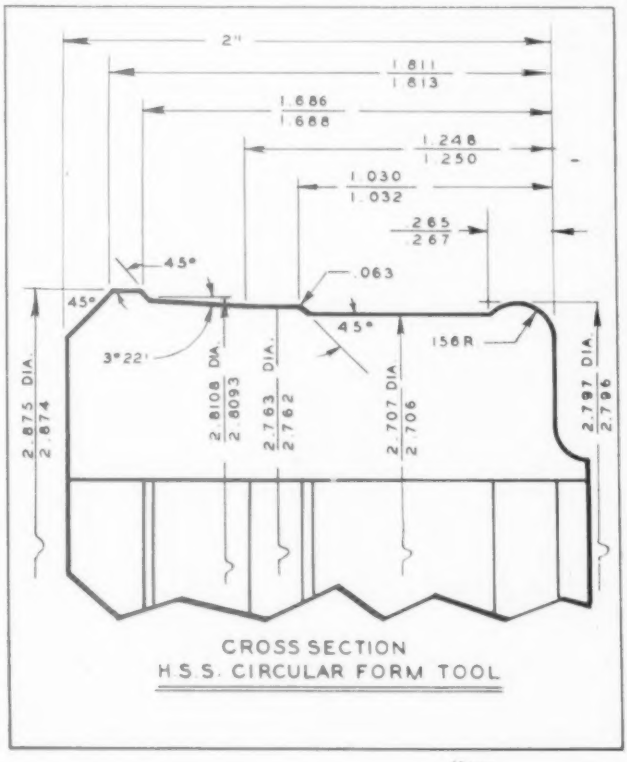
There is a small amount of helical interference between the wheel and the work when grinding with zero helix angle wheel setting; and this interference is sufficient to prevent meeting tap manufacturers' standards for root clearance.

FIG. 6.



	Hours
Layout	1.5
Grind Crusher	4.5
T.F.G. Setup	.5
Rough Grind 6 Tools	1
Finish Grind 6 Tools	1
Micro-Form reoperation	3
Total Time	11.5
Time per tool	1.92
Former grinding time	5

FIG. 7.



	Hours
Layout	1.5
Grind Crusher	4
T.F.G. Setup	5
Rough Grind 6 Tools	1.5
Finish Grind 6 Tools	1
Micro-Form reoperation	None
Total Time	8
Time per tool	1.33
Former grinding time	4.75

Production grinding of taps, Fig. 8, in pitches as fine as 28 and 32 is being done successfully by setting the multi-ribbed grinding wheel at the pitch line helix angle for the product. This eliminates the consequences of helical interference but makes it necessary to shorten the lead spacing of the crusher roll in the proportion of the cosine of the helix angle setting. The net result is a tap of much greater wear life due to the free cutting action of the crushed wheel which eliminates burning and loss of hardness.

The normal plunge grinding practice of pulling the wheel into full depth is changed to the extent that the plunge time is distributed over at least two turns of the work while a higher work speed is used. On the comparatively frail finer pitch taps, this is desirable for the elimination of work deflection in the grinding operation. A single machine cycle will produce "commercial grind" tap tolerances grinding from the solid.

The practice of setting a multi-rib wheel at the work helix angle to minimize helical interference effect, has reopened studies of small worm grinding with highly satisfactory results. For pitch line helix angles up to 15° it has been found that the crusher roll can be made to normal gear tooth rack form in the range from 20 to 60 diametral pitch with no additional correction of form required. With the wheel in face widths up to an inch or 1¼" set at the appropriate helix angle, small commercial worms may be plunge ground or traverse ground from the solid at high rates of production.

The part illustrated in Fig. 9 is a double-start 32 diametral pitch worm with conventional 14½ degree pressure angle. The worm form on this part was ground from the solid in 35 seconds with the wheel set at 11 degrees 26 minutes helix angle.

Limits of Application

The plunge grinding of multiple starts is limited in its application by the fact that the multiple threads begin or end at the same angular position on the workpiece. In some product designs this will cause interference with shoulders, bearings, and so forth. It has been found that designs can be frequently modified in the interest of obtaining the high production made possible by plunge grinding.

Where helix angles as high as 20° are required in worm grinding, it may be necessary to make additional corrections in crusher profile, in order to compensate for wheel and work contact above and below the axial plane of the work at the ends of the thread portion. Normally, the amount of this correction is very slight.

The automotive and tractor industry are finding an increasing number of applications for multi-rib plunge thread grinding in threading important components. Automotive parts which can be plunge thread ground with high economy and high quality include such items as the rear drive stem pinion, the steering knuckle, and several bearing-securing threads on transmission spline shafts and gear shafts.

One very large manufacturer has found that, aside from a favorable comparison of direct threading operation cost, it is also possible to eliminate copper plating operations for protection of thread areas through heat treatment—that it is possible to make threading the final operation in manufacture of the part, avoiding the danger of thread damage in handling the other operations.

A typical automotive steering knuckle, Fig. 10, with a ¾-20 Class 3 thread an inch long is ground from the solid as a final operation in 14 seconds of actual wheel contact, or at an overall production rate at 120 pieces per hour, after normal operator allowances have been made. Burrs at keyways and cotterpin holes are eliminated.

Production of Annular Forms

Another broad field of application for plunge grinding is similar to form tool grinding, in that the forms produced are annular in nature. The ball bearing industry is finding increasing demands for sealed types of bearing assemblies. Most designs of this class of bearing call for more or less intricate profiles on the outside ends of the inner race. These forms can readily be produced by the crush grinding method, meeting normal surface finish specifications and normal accuracy requirements.

Bearing manufacturers are also finding it desirable to semi-finish grind the ball race radius in connection with the finish grinding of the seal diameters; and current experience permits the conclusion that it may soon be possible to finish grind the ball race radius simultaneously with the seal contours. The cool, fast cutting made possible by wheel crushing permits high production, even where excessive metal is required.

Seaming rolls and threading chucks, for example, as used in the metal cap, or electric lamp industry are being produced by crush grinding at substantial savings over former machining methods.

Fig. 11 shows a crush trued wheel grinding a seaming roll from a solid tool steel blank. The time required for rough and finish grinding was about 3 minutes per tool.

The two-start threading roll, used in conjunction with the seaming roll just described, was ground from the solid in two traverse passes, one for roughing and the second for finishing (see Fig. 12). The thread form has a radiused crest and flat roots. Total grinding time from the solid was four minutes per tool.

FIG. 9, BELOW.

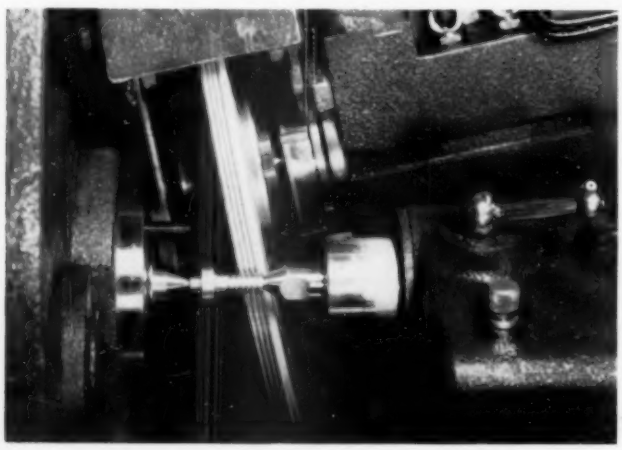


FIG. 10, at RIGHT.

Choice of Coolants

Wide differences of opinion have developed as to the best approach to certain details of the crush grinding process. One of these differences concerns the choice of coolants to be used with crushing. As a consensus of today's practice, it may be said that grinding oils are used almost exclusively in production applications of crush grinding. The oil enhances crusher performance and crusher life in the truing operation, apparently reducing pressure as a result of the lessening of friction and abrasion in roll-wheel contact.

In grinding operations, with any truing method, grinding oil has demonstrated an ability to maintain irregular wheel profiles for a longer period. This applies to crush truing as well as any other truing method. Those oils, which have a capacity for partially or fully wetting the surface of contact between the wheel and the workpiece, seem to give the highest return in stock removal and extension of wheel life.

Water soluable grinding coolants are used in different crush grinding applications, but the results reported from such jobs do not compare too favorably with normal expectancy from the use of a grinding oil.

Especially in toolroom applications, dry crushing has been used with reasonably satisfactory results. This dry crushing has been frequently used on coarse grit wheels, employing grades and grains previously used with diamond truing. In some jobs, a stiff brush is run against the wheel or the roll during the crushing operation, and in other cases a jet of compressed air serves a similar purpose of helping remove displaced grit. It would probably be correct to say, however, that dry crushing has been found superior to crushing with water soluble coolants.

Improving Wheel Specifications

Various wheel manufacturers have cooperated extensively with the manufacturers and users of crush grinding, and have in some cases conducted extensive tests in their own laboratories with the object of improving wheel specifications for crush grinding. The wide variety of abrasives, bonds and wheel densities would make it very difficult to specify exactly what grinding wheels are best suited to crush grinding. However, for use with oil as coolant the general choice of grit size is in the range from 120 to 320. The wheel is frequently a combination of two or more grit sizes in this range.

Aluminum oxide is the most common grit, probably because the majority of grinding problems are in materials for which aluminum oxide is the preferred abrasive. No crushing trials in bonds other than vitrified have been favorable. The resilience of organic bonds prevents sufficient localization of pressure at the point of wheel and roll contact to fracture or break loose individual particles.

The structure and density of wheels for crush grinding is in general very similar to that which is used for other truing methods. Where high work speeds are involved, the wheel hardness should probably be increased slightly.

Crusher Roll Materials

Much thought and effort has been devoted to the choice of materials for the manufacture of crusher rolls. Actually the operation can be done successfully with any materials in the broad range between soft, mild steel through the hardest of the cemented carbides. In most applications it will be desirable to balance the cost of the material and making the crusher roll as well as regrinding, against the life of precise form obtained with the roll material.

Comparative tests of a variety of materials indicate that the standard tungsten types of high speed steel and the abrasion resisting high carbon, high chromium steels which are fairly easy to grind will give the most economical crusher life. The "super" alloys of iron, the chromium carbides and the cemented carbides will provide longer roll life per reconditioning of the roll, but show a disproportionate original and reconditioning cost. The need remains for even wider studies of materials for the making of crusher rolls.

Different users of crush grinding have different practices on the matter of the irregular gashing of the crusher roll surface and it is felt that these gashes, or slots in a roll serve several useful purposes. They tend to reduce crushing pressure by permitting periodic penetration of the outer wheel surface by the sharp corners. They provide channels for the washing out of displaced grit by the coolant and on deep profiles they tend to keep a more even distribution of crusher wear over the entire profile.

Effect of Gashes on Crusher Life

On the most commonly used crusher forms, however, such as standard U. S. form threads, crusher life is almost identical, with or without the gashes. As a result, American and European manufacturers of crusher rolls have generally discontinued the gashing of thread form rolls. There are probably enough benefits to be obtained by gashing that the

FIG. 11.

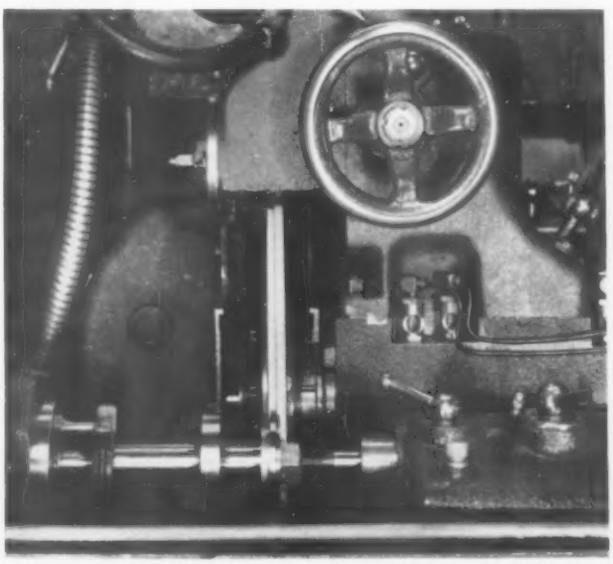
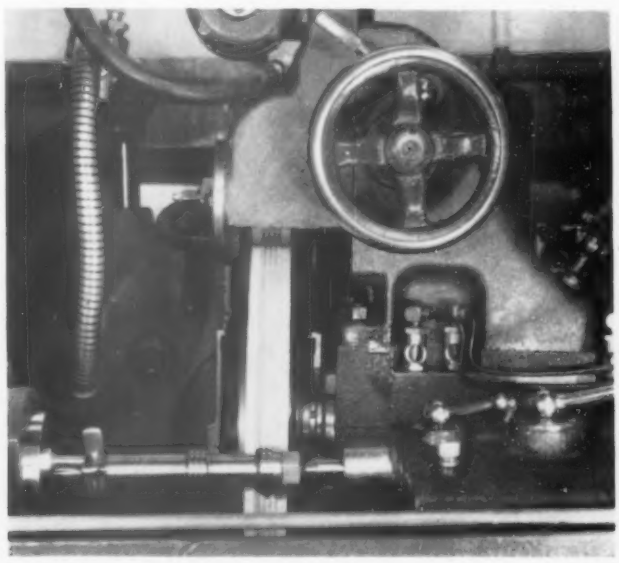


FIG. 12.



method should logically be used on deep special forms in all cases, leaving other applications to the users' option.

The crushing operation is carried out at reduced speed of the grinding wheel. In most instances this reduced speed is about 5% of the speed used in grinding with a vitrified bond wheel. The crushing can be done successfully at higher surface speeds than this, with accelerated crusher wear results. At slower speeds the time required for the truing operation is increased. Consequently the speed range from 200 to 300 surface feet offers a satisfactory compromise rate.

The user of crush grinding may have the option of letting the crusher roll drive the wheel to produce this slow speed, or may have the grinding wheel turned at reduced speed by an auxiliary drive with the dressing roll an idler. Crusher life is usually greater where the roll is an idler, even in those cases where more torque is required to turn the roll than is required to rotate the wheel and its connecting elements. This fact would support a conclusion that the member of least inertia, rather than the member of least resistance to rotation, should be the driven member in the crushing operation.

In the period since the first introduction to American industry of crush grinding machines, at least three additional lines of machine tools, all made by different manufacturers, have been offered on this market. Special applications are made on customer request by other machine tool manufacturers. This is forceful evidence of the acceptance of crush grinding by the manufacturing industries of the country, and it also permits of the logical conclusion that we may expect a constantly increasing use for the method.

High Production and Living Standards*

IN THESE DAYS when both living costs and wages are the highest they have ever been, supplies of all kinds are still scarce or unavailable, and production workers are clamoring for still higher wages and still shorter hours, nothing clears the atmosphere and indicates the direction in which we are headed so much as the type of conference that was held by the American Management Association in Chicago in November.

At that meeting many prominent manufacturers, economists, engineers and labor leaders aired their ideas on the current economic situation, and all came away with a better understanding of the others' problems and attitude toward the situation in general. Many of the ideas expressed there were both significant and enlightening.

For instance, the idea was emphasized that America's high living standards have been made possible by America's ingenuity in developing production machines and tools. Now we should carry on, producing by machine at an even higher rate of productivity, thus reducing production costs and making more products available to more people, all of which increases living standards for everyone. Altogether fallacious is the idea that living standards can be raised by restricting production through shorter hours of work, at higher costs.

John D. Gill, economist, expressed the opinion that "wage increases should be in proportion to the change in real income of gainfully-employed workers, estimated as needed to absorb the output of proved productive capacity." He said that "if the wage change is initiated by the employer, he must act on the belief that, while a wage increase may temporarily reduce profits, in the long run it should increase his dollar profits by enlarging the market for his goods."

That statement brings up the question, "How much can a manufacturer enlarge the market for his product by increasing the wages of his employees?" Every increase in labor costs means a corresponding increase in prices, which in turn tends to restrict the market. The result may be that the market has been restricted rather than developed or increased.

Richard Leonard, International Vice President of the United Auto Workers, CIO, asserted that "few workers believe that, as production increases, prices decline and markets expand."

The answer to that statement is a matter of history. Let's go back to the story of the spinning machine, which was probably the first important labor-saving device. The invention and perfection of this machine increased the productivity of a weaver by 700 times. Yet in 1856 the employees of the British textile industries numbered 379,000 as compared with 218,000 twenty years previous. By 1914 the number of employees in this industry had reached 689,000. While the population was doubling, the number of workers in this highly mechanized industry was trebling.

In the printing industry it is estimated that machines have multiplied the production per man by three to four times within the last thirty years, yet the number of persons employed in the printing trades today is more than three times as many as were employed in this industry 50 years ago.

According to figures supplied by James S. Thomas in "Nation's Business" some years ago, the development of production machines and tools between 1920 and 1928 released approximately 2,000,000 workers. But during that same period the number of persons employed in the driving and servicing of automobiles—a product of the machine age—increased by 750,000. Expansion in insurance fields, largely made possible by the development of the automobile, increased the number of insurance agents by another 100,000. Electric refrigeration, oil heat, and improvements in light and power provided employment for another 100,000. Construction work and management, largely made possible as a result of the advantages provided by the automobile and other machine-age improvements, provided jobs for an additional 100,000.

In that time motion picture theater employees—working on jobs created by another machine—increased by 125,000. Radio—also placed within reach of the public by the machine—created jobs for 200,000 more people during the same period. The increase in travel, due largely to the fact that the low manufacturing costs made possible by the high-production machine had placed the automobile within the reach of the masses, made necessary increased hotel and restaurant facilities for which an additional 750,000 people were required.

"Altogether," Mr. Thomas wrote, "While the machine was displacing some 2,000,000 workers, the increased efficiency made possible by the machine was providing jobs for more than 2,500,000 people directly and some 2,000,000 more indirectly. The difference more than accounts for the increase in population in the same period. At the same time, the per capita earning power was increased and the standards of living were raised throughout the nation."

It is significant that here in America, where production machines and tools have been developed to a greater extent than in any other country in the world, living standards are also the highest of any country in the world, and in such countries as the interior of India, where modern production methods are still unknown, living standards are the lowest. The relation between these two facts should be obvious to any intelligent person.

Howard Campbell

*Reprinted from January, 1947, *Modern Machine Shop*.

By **Jno. M. Cannon**

Numerical Classification—A Milestone in Standards Progress*

New and Useful Tool Brings Closer Long Range Goals of Industry-Controlled Standardization

SINCE THE OUTSET of mass production, which was coincident to the acceptance of the principal of interchangeable manufacture, vigorous efforts have been made, by groups within industry and government, to curtail vast industrial losses through application of systems for simplification. Many of these systems have evolved into standards accepted generally by the whole of industry.

***Jno. M. Cannon*, Public Relations Director, American Society of Tool Engineers, was born in South Carolina and attended Bailey Military Institute, Wofford and Presbyterian Colleges and Columbia University. Before entering the field of industrial and public relations, he was chief editorial writer on several metropolitan newspapers and editor and publisher of his own newspaper, "The Camden Chronicle." He is an active member of the American Council on Public Relations.**

It has long been recognized that setting up and continuance of necessary standards are vital to proper operation of scientific engineering and management. Engineering in all of its branches, and engineering management in particular, are therefore urged to lend more active support to the present trend of standardization. This is important because standardization is, today, one of the most important factors in achieving greater industrial efficiency.

The Twain Are Brothers but Not Twins

While there is a vast difference between standards and specifications, engineers in all lines have recognized the importance of developing a system for classifying specifications which, at the same time, could be used to classify industrial standards.

Experience over the years has shown that it is necessary to employ *specifications* for a product primarily as a basis for contract buying. Specifications, presented conveniently in a well-considered, orderly system, allow the engineer—or buyer—to compare the operating qualities and other factors of similar commodities in deciding which of the products best answer specific need. Such information serves also to protect the buyer from unscrupulous vendors.

A *standard*, on the other hand, is a set of specifications for a given commodity, arrived at on a voluntary basis by an entire industry, including both makers and buyers, which enables all manufacturers involved to produce the commodity so that it will have identical basic characteristics, no matter which of the manufacturers produce it. These standards may involve quality of material, tolerances or dimensional limits, physical properties, or exact determinations of elements such as weights and measures.

Thus, we may say that specifications, as applied here, represent a statement of the operating and physical characteristics of a single manufacturer's product to be used as a basis of comparison to a similar product of another manufacturer. Standards, by the same yardstick, are specifications generally accepted by all or the bulk of an industry which may be applied to like products of all manufacturers in the field to which specific standards are applicable.

Crying Need for Adequate Classification

There is ample evidence that standardization is enlarging in scope and is being extended to many fields heretofore untouched by benefits of organized standards. As the complexity of technical developments increase, there is need for an elastic system by which standards, specifications, information on industrial processes, and other technical data can be made quickly available for ready reference.

The National Standards Committee of the American Society of Tool Engineers has witnessed the development which makes the establishment of such a system of classification imperative, and has assumed the task of developing and adopting an adequate classification system—or commodity index—to meet the peculiar needs of the metal working industries.

In setting up, modifying, and adopting this commodity index for Tool Engineers, the Society has pioneered an entirely new field. The ASTE National Standards Committee has made a contribution to industry which is not matched by the work in standardization of any of the other technical societies. In this forward step the membership of the Society can be justly proud.

Charles Davies, a famous New England mathematician who lived in the early days of the Industrial Revolution, once said:

> "Science has been well defined to be knowledge reduced to order: that is, knowledge so classified and arranged, as to be easily remembered, readily referred to, and advantageously applied."

That statement applies aptly today to the new ASTE *Numerical Index*.

Why Numerical Index Was Developed

In the past, ASTE Data Sheets were designed to be filed alphabetically under the company name of the product described. Using this system, twist drills, for example, might appear anywhere in the alphabet from *A* to *Z*, depending on the names of the manufacturers.

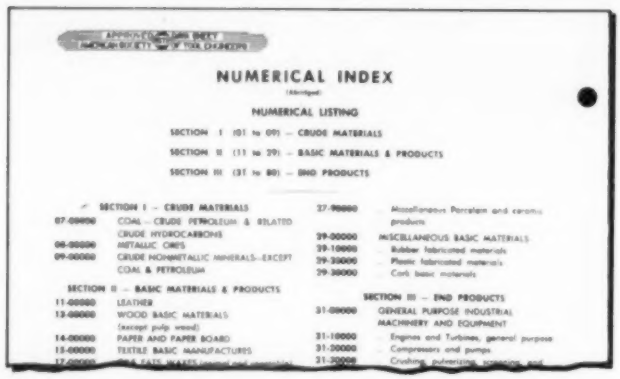
Under the new *Numerical Index* system, similar twist drills of all manufacturers are assigned a single definite number and in the user's files all similar twist drills may be found on adjacent sheets. Data Sheets for twist drills of special sizes or types will also be found together, making for further practical advantages.

The disadvantages and limitations of the old alphabetical system are obvious. Even a superficial examination of the *Numerical Index* will quickly reveal its utility, convenience and flexibility.

Mechanics of the System

The ASTE *Numerical Index* is divided into two sections: a *numerical listing* and an *alphabetical listing*. The numerical listing is used to classify and file Data Sheets and other technical and mechanical information to which the correct numbers have already been assigned. The alphabetical list-

*The A.S.T.E. Numerical Index, recently published for the classification of industrial standards and specifications, provides a new and useful tool for Tool Engineers. Developed by the National Standards Committee for simplification of Data Sheet filing, this index will find myriad other usages throughout industry.



NUMERICAL INDEX

(Abridged)

NUMERICAL LISTING

SECTION I (01 to 09) — CRUDE MATERIALS

SECTION II (11 to 29) — BASIC MATERIALS & PRODUCTS

SECTION III (31 to 80) — END PRODUCTS

SECTION I — CRUDE MATERIALS

07-00000 COAL — CRUDE PETROLEUM & RELATED CRUDE HYDROCARBONS

08-00000 METALLIC ORES

09-00000 CRUDE NONMETALLIC MINERALS—EXCEPT COAL & PETROLEUM

SECTION II — BASIC MATERIALS & PRODUCTS

11-00000 LEATHER

13-00000 WOOD BASIC MATERIALS (except pulp wood)

14-00000 PAPER AND PAPER BOARD

15-00000 TEXTILE BASIC MANUFACTURES

17-00000 [illegible]

27-90000 — Miscellaneous Porcelain and ceramic products

29-00000 MISCELLANEOUS BASIC MATERIALS

29-10000 — Rubber fabricated materials

29-20000 — Plastic fabricated materials

29-30000 — Cork basic materials

SECTION III — END PRODUCTS

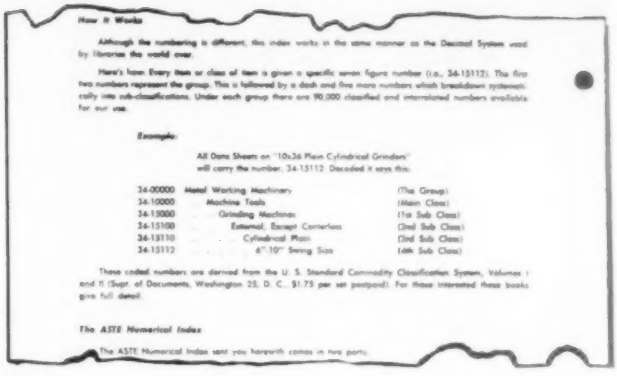
31-00000 GENERAL PURPOSE INDUSTRIAL MACHINERY AND EQUIPMENT

31-10000 — Engines and Turbines, general purpose

31-20000 — Compressors and pumps

31-20000 — Crushing, pulverizing, screening, and

FIG. 1.



How It Works

Although the numbering is different, this index works in the same manner as the Decimal System used by libraries the world over.

Here's how: Every item or class of item is given a specific seven figure number (i.e., 34-15112). The first two numbers represent the group. This is followed by a dash and five more numbers which breakdown systematically into sub-classifications. Under each group there are 90,000 classified and interrelated numbers available for our use.

Example:

All Data Sheets on "10x36 Plain Cylindrical Grinders" will carry the number, 34-15112. Decoded it says this:

34-00000 Metal Working Machinery (The Group)

34-10000 Machine Tools (Main Class)

34-15000 Grinding Machines (1st Sub Class)

34-15100 External, Except Centerless (2nd Sub Class)

34-15110 Cylindrical Plain (3rd Sub Class)

34-15112 6" 10" Swing Size (4th Sub Class)

These coded numbers are derived from the U. S. Standard Commodity Classification System, Volumes I and II (Supt. of Documents, Washington 25, D. C., $1.75 per set postpaid). For those interested these books give full detail.

The ASTE Numerical Index

The ASTE Numerical Index sent you herewith comes in two parts.

FIG. 2.

ing is used to locate specific material when the user does not know the code number applicable to the product or process on which he is seeking information.

For example, suppose a user requires information on Reamers. He simply looks in the alphabetical listing under the letter "R" and finds that Reamers are classified under number 34-91080. Under that number and on adjacent pages he will likely find engineering data and specifications on Reamers made by several different manufacturers. He will then be able to readily compare the data of the several makers and decide which make or type of Reamer is best suited to the work under consideration.

If there are accepted national standards on Reamers, or if such standards are adopted at any future time, this information and data will also be filed under number 34-91080. Thus, the system is equally applicable to both standards and specifications. Sample sections from the Index (Figs. 1 and 2) illustrate how products are classified and how numbers are assigned.

Adopted from U. S. St'd Commodity Classification

The *United States Standard Commodity Index** was first published in May 1943, to answer a long-felt need for an orderly method for classifying *all kinds of products* ranging from capital goods and manufactured consumer products to mineral products and agricultural commodities. The present two-volume work, representing the cooperative efforts of industry and government, classifies nearly every physical object—whether machine, tool or material—now in existence or in project.

The code numbers in the ASTE *Numerical Index* were selected from the U. S. Standard Commodity Classification and the code numbers in both systems are, with few exceptions, identical. In the ASTE *Numerical Index*, however, only those classifications applicable to tool engineering, metal working industries and closely related fields are included.

When the ASTE *Numerical Index* has been in use for a few months, there will probably be found a need for including certain classifications that have been omitted. These will be added in the next edition of the index and, likewise, each succeeding edition will be revised to meet requirements as they arise. While some other classifications appear in the present work, most Tool Engineers are interested primarily in the 34-00000 group, classified broadly as metal working machinery.

More than 1000 man-hours of volunteer committee work and 1500 man-hours of clerical and printing time have gone into this work designed by Tool Engineers for Tool Engineers' use. All future Data Sheets will be numbered in accordance with the new system and the proper index number will be printed at the top outer corner of all new Data Sheets. Numbers will be asisgned only after careful study and consideration by the Data Sheet Sub-Committee.

In the past all ASTE Data Sheets have been concerned with specific products. The new classification system gives rise to a new type of Data Sheet which will present engineering information on the general performance, use and application of a general class of product and on standards applicable to products. These releases will be given the broadest classification number possible and, therefore, will be filed just ahead of, but separate from Product Data Sheets. This new service will provide a wealth of technical information on processing, designing and other subjects pertinent to tool engineering.

Other Benefits Offered Now and in the Future

Aside from classifying engineering information sheets, the ASTE *Numerical Index* offers an easy method for Tool Engineers to classify and file all types of engineering data. Engineers are constantly clipping articles, filing away books and pamphlets, making or collecting tables, and otherwise attempting to keep readily available a mass of technical information.

Those who are confronted, and often confounded with the problem of finding this material when they need it can now assign the proper number to each bit of information and place it at their finger-tips. For instance, suppose you want to preserve an article or table pertaining to grinding machines. This can be easily done (see Fig. 2) by assigning number 34-15000 to the article and filing it accordingly.

While the ASTE *Numerical Index* was designed exclusively for the use of Tool Engineers, it has been reported already that one very large manufacturing plant has classified all of its machines through use of the system. The National Standards Committee is not advocating, nor is it recommending that the *Numerical Index* be used for purposes other than for classification of Data Sheets and engineering information by Tool Engineers. But it is recognized, by many individuals who have studied the system, that industrial plants and other types of businesses, as well as engineers in other fields will find many practical uses and applications for such an index.

The versatility of the *Numerical Index* is almost unlimited. Tool Engineers and industry will be quick to realize that without such versatility in standards planning, manufacturing progress could not continue its forward march. This contribution to constructive standards planning should help materially in reaching and maintaining the goals in standardization that will set new records for production and increase living standards everywhere. These goals are: (1) to stimulate competition; (2) to make for improvements in performance of all products; (3) to help in making competition fair and clean; (4) to promote a better understanding between buyer and seller; (5) to inspire confidence in honest products; (6) to broaden and improve markets; (7) to expedite sales; and (8) to render material aid in bringing about higher standards of living and to better our general economic conditions.

*"The U. S. Standard Commodity Classification System," Volumes I and II, may be purchased complete for $1.75 per set, postpaid, by writing to the Superintendent of Documents, Washington 25, D. C. For those interested in broader classifications, these books will give full details.

By The National Bureau of Standards

New Diamond Die Drilling Method

Unusual Technique Speeds Up a Tedious Process and, In So Doing, Practically Revolutionizes an Industry

A NEW ELECTRICAL METHOD, for drilling small diamond dies used in drawing and shaping extremely hard and fine wire, has been developed at the National Bureau of Standards. This discovery, which eliminates almost 100 man-hours from older processes, has completely revolutionized the fine-wire diamond die industry.

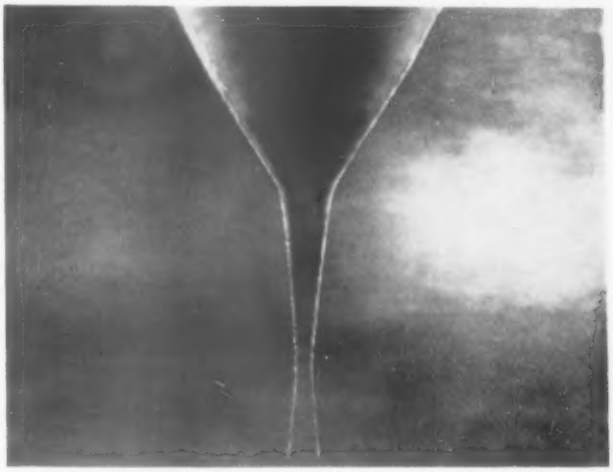
Although dies of tungsten, molybdenum, or boron carbide have, in recent years, competed with diamond dies, the diamond is still the only tool used in shaping the harder and tougher materials, such as chrome nickel, brass and phosphor bronze, and high-carbon steel wires. Moreover, wires finer than .015" in diameter can be drawn only by diamond dies. In addition, the diamond is indispensable whenever precision of size and perfect roundness are essential considerations. Important uses for diamond-drawn wire are in radar and radio equipment, in high-frequency coil windings, as filaments for small tungsten lamps, and in delicate and precise electrical instruments. Wires of this type have become increasingly important with the expansion of the electronic and allied industries.

Ordinarily, the drilling of diamond dies, widely used for the drawing of fine wire, is a slow and expensive process. Because the new method described—a development of the National Bureau of Standards, Washington, D. C.—greatly reduces the time for drilling, this article is of vital import to Tool Engineers engaged in the manufacture of fine wire.

The Editors

Prior to 1940, the indispensable small diamond dies were imported from Europe because labor costs made their manufacture unprofitable in this country. During the war, when all supplies from Europe were cut off, the National Bureau of Standards undertook an investigation to speed up the manufacturing process and improve the quality of dies to meet the emergency requirements for many vital war products.

A diamond die consists of five surface areas: the primary cone, the secondary cone, the reduction cone, the bearing, and the exit cone. In appearance such a die is similar to a wine glass. The portion of the die where the wire enters—the primary cone—corresponds to the goblet part of a wine glass. The narrowing stem from the bottom of the goblet to the base of the glass corresponds to the secondary cone, the reduction cone, and the bearing. Actual wire shaping takes place at the bearing. Finally, the base of the wine glass represents the exit cone.



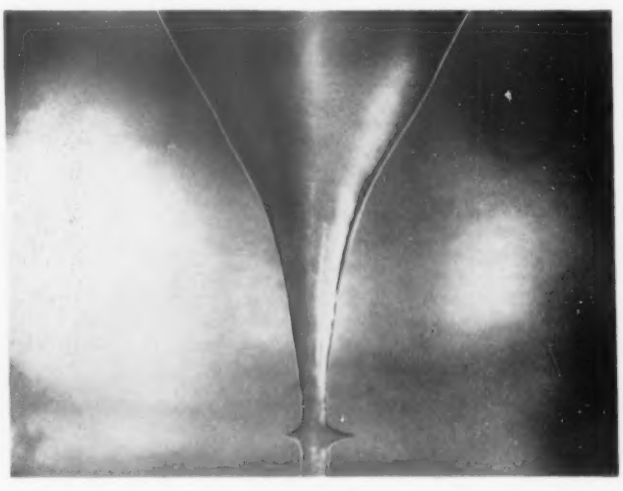
Two distinct steps are involved in making the secondary cone at the apex of the primary cone in a diamond die. The first requires 30 minutes of electrolytic drilling with a 5 per cent aqueous solution of sodium chloride. The second step involves 40 to 45 minutes of drilling with a solution of potassium nitrate at the end of which time the back of the diamond die is pierced.

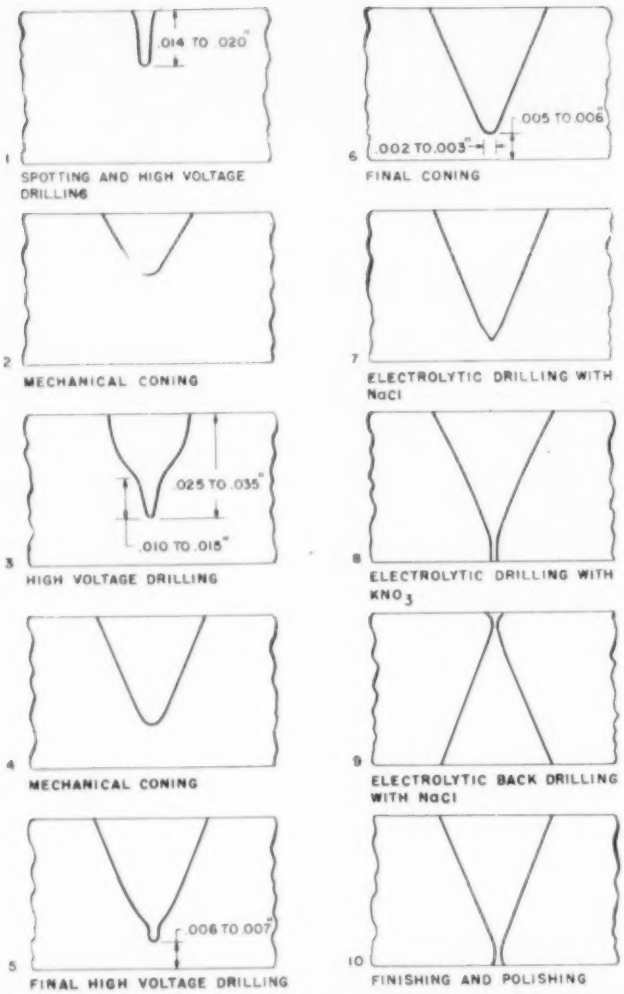
The new process, developed by C. G. Peters, Chief of the Interferometry Section, and his associates, W. B. Emerson, K. F. Nefflen, F. K. Harris, and I. L. Cooter, replaces the older mechanical die cutting with high-voltage drilling followed by electrolytic drilling.

The primary cone is drilled by means of high-voltage

The primary cone is a diamond die before mechanical coning. In the National Bureau of Standards method for making these small dies, the primary cone is made by three applications of high-voltage, followed each time by mechanical coning. The completed primary cone is .006" to .008" from the back surface of the diamond.

The profile of the finished diamond die shows the slight countersink made by back-surface drilling with sodium chloride for four or five minutes. The shaping action on fine wire takes place in the secondary cone. The countersink at the exit prevents chipping and undue wear on the die.





The 10 successive steps in the National Bureau of Standards method of making small diamond dies. This method, combining electrical and mechanical operations, has reduced the average time required for making a die by more than 100 hours.

sparks formed at the point of a needle electrode in contact with the face of the diamond. These sparks release the energy stored in a condenser which has been charged to a high voltage by a transformer. The condenser is charged through a "quenched" gap consisting of a number of very small gaps in series.

When rising voltage is applied to the circuit, sparking occurs first at the quenched gap. This is followed, as the voltage is increased, by a discharge across the face of the diamond between the needle electrode and the brass block on which the diamond is mounted. Without the quenched gaps in the circuit, the discharge would be a more or less continuous arc, overheating the diamond and producing a dark deposit on its surface. The rate of drilling increases with the power input into the circuit until a limit is reached where the temperature of the diamond is too high and its surface takes on a frosty appearance. The drilling needle, which is 0.02" in diameter, becomes red hot at its tip before this "frosting" point is reached and the reddening point of the electrode is used as a criterion in adjusting the power input to the circuit.

The secondary cone is formed by the action of a low-voltage spark in an electrolytic solution. The diamond is mounted on an insulating post in a shallow glass dish and enough of the electrolyte is used to fill the dish and just cover the diamond. The "drilling" electrode is a platinum-iridium needle that is lowered into contact with the bottom of the primary cone and rests with very light pressure (around one-fifth of a gram) on the diamond. A second electrode dips into the solution at some distance from the diamond.

When a low voltage (around 90 volts) is applied between the electrodes, sparking occurs at the tip of the drilling needle and a smooth-walled conical hole is formed in the diamond directly under the needle. The shape of the hole and the angle of its walls are controlled by the type of electrolyte used, while the hole size is controlled by the pressure of the needle against the diamond. The power input into the circuit is controlled by the depth of the solution covering the diamond and by the voltage applied.

Technique Involves 10 Steps

The National Bureau of Standards' method of making small diamond dies consists essentially of 10 steps, which combine electrical with some mechanical drilling. The die blank, which is used in these operations, has two plane-parallel faces between which the die will be formed, and a side window for viewing the progress of the drilling. These are cut on the diamond, using a rotating cast-iron lap with diamond powder as an abrasive. The cutting action of the lap is accelerated by the application of a high-voltage electric arc across the face of the diamond being cut.

In the No. 1 operation, ten minutes of high-voltage drilling of the blank—called spotting—produces a cone 0.014" to 0.020" deep that serves as a pilot hole for the next operation. This is followed by 30 to 40 minutes of mechanical drilling, operation No. 2, to cone out the hole, using diamond

Plane-parallel surface and the viewing window for each die are cut on this rotating cast-iron lap using diamond powder as the abrasive. The cutting action is accelerated at the National Bureau of Standards by the application of an electric arc.

Equipment for high-voltage drilling in the Interferometry Laboratory of the National Bureau of Standards. The diamond blank is cemented on a brass block and the electrode is lowered onto the diamond surface. Each high-voltage drilling operation requires about 10 minutes.

Mechanical coning follows each high-voltage drilling. Although coning generally takes 30 to 40 minutes, the actual man-hours required are few since one operator can tend 10 or more spindles at one time.

powder in a gelatin solution as the abrasive. Operation No. 3 is repetition of the first high-voltage drilling and is followed by step No. 4, mechanical coning. The final fore-drilling, operation No. 5, should bring the bottom of the cone to between 0.006" and 0.008" from the back surface of the diamond.

Step No. 6—the final primary coning—demands greater care than the other similar operations to assure a symmetrical shape, free from drilling rings and with either a polished or fine matt surface. The diameter of the cone immediately above its apex should be between 0.002" and 0.003" for good blending of the primary and secondary cones.

Operation No. 7 begins the series of three electrolytic drilling operations, using two different solutions—sodium chloride and potassium nitrate. The first drilling of the secondary cone utilizes a 5 per cent aqueous solution of sodium chloride.

Advantages of Sodium Chloride

Although an electrolyte of potassium nitrate produces a relatively long, narrow cone of correct size and shape for the secondary cone, the hole drilled using this solution tends to be out of alignment with the primary cone if drilling is attempted directly in a primary cone with a broad, unpointed, or irregular bottom. Excellent alignment and better blending of the primary and secondary cone is obtained using sodium chloride, although an additional thirty minutes for this step are needed.

Drilling the main body of the secondary cone with potassium nitrate is similar to operation No. 7 except that the electrolyte solution is stronger and the tip diameter of the drilling electrode is smaller, ranging from 0.0010" to 0.0015". After 40 to 45 minutes drilling time the drill will have pierced the back face of the die, giving a smooth-bore cone with a length of about 0.006" and a diameter at the bottom of 0.0005" to 0.0006". If the initial distance between the bottom of the primary cone and the back of the die was greater than 0.005", the drilling may not pierce the back of the diamond and an additional 40 minutes drilling with potassium nitrate, using a resharpened electrode, is necessary.

The sharp edge formed at the intersection of the secondary cone and the back surface is given a slight countersink in operation No. 9 to prevent damage when wire is drawn through the die. This countersink is made by inverting the die beneath the drilling electrode and drilling electrolytically from the back for four or five minutes, using the solution of sodium chloride.

The final step is finishing and polishing, a mechanical operation that improves the blend between the primary and secondary cones, improves the roundness of the die, and improves the shape and polish of its working parts. Electric drilling, producing superior dies, takes 7 to 15 hours, depending on the type of die, with 10 hours as an average for this new process. Actual man-hours are considerably less than this, averaging about 2 man-hours per die, because almost every stage in the process is easily adaptable to multiple production.

Disadvantages of Mechanically Drilled Dies

Dies produced by the National Bureau of Standards' method have better wearing characteristics in service than those produced by purely mechanical methods. In mechanically drilled dies, holes are started in the top and bottom of the diamond by "bruting" or gouging the face of the diamond with a small diamond chip. The hole is drilled through the body of the diamond by "pecking" it with a spinning steel needle charged with diamond powder, a sort of "star-drilling" process.

These operations result in severe strains and minute fractures in the walls of the die cones, and although the magnitude of the strain resulting from mechanical drilling decreases with reduced load on the drilling needle and with the size of the diamond powder used, it is still present in most mechanically drilled secondary cones. Frequent failure by chipping at the intersection of the secondary and exit cones of dies so drilled is ascribed to weakening of the material by the mechanical treatment. Likewise, rapid wear of some dies at their initial size may be attributed to disruption of material, underlying the working surfaces of the dies, that has not been removed by sufficient polishing.

Outstanding Advantages of New Method

In contrast to the condition found in mechanically drilled dies, cones produced by either the high-voltage or the electrolytic drilling process show no strain in the surrounding material when examined under polarized light. The freedom from strain and fractures results in less wear as the die is used to draw wires. The electrical methods of die formation are therefore particularly adapted for small dies used in drawing wires, 0.0015" in diameter, or smaller.

The electric method requires no special skills or long training on the part of operators. Equipment is inexpensive and the drilling technique is simple, making the work less tedious and more practical for small as well as large scale enterprise. A satisfying development of the National Bureau of Standards' investigation is that domestic die makers now find it advantageous to produce these small dies themselves, whereas formerly they were obtained only through importation.

The National Bureau of Standards' equipment for electrolytic drilling. The drilling electrode is supported by a coil spring and rests lightly on the diamond. The second electrode dips four to five millimeters deeper in the electrolyte solution, completing the circuit and causing electric arcing at the surface of the diamond.

By Thomas A. Dickinson

Report on Flexible Molds

Desirable Qualities of Plastic "Elastomers" Permit Finished Molds to Be Made in Less Than Three Hours

Mr. Dickinson

ADVANTAGES OF FLEXIBLE molds for casting various materials at low temperatures have been well-known to Tool Engineers and others for a number of years, but they might be briefly summarized here as follows: (1) They are comparatively easy to fabricate. (2) They obviate the need for complex "piece molds." (3) They have smoother surfaces and better release characteristics than most inexpensive rigid molds, and can therefore produce better finishes on casts.

Probably the two most widely-used flexible mold materials thus far have been glue-gelatin and rubber latex.

Glue-gelatin is made by heating water-soaked gelatin to about 200° F. and mixing with small quantities of glycerine, glucose, and alcohol. It is used to make molds by pouring, in the molten state, over patterns of articles to be cast and allowing it to harden by cooling. Such molds must be handled with considerable care, but are quite suitable for the casting of low-temperature materials, such as plaster, when they are properly dried and lubricated. Further, when they have served their purposes, glue-gelatin molds can be reclaimed by melting and re-cast over new patterns.

Rubber latex molds are more difficult to fabricate, since they necessitate repeated applications of "raw rubber" in layers on a pattern, and also rather prolonged periods of heat-curing. However, they have improved strength characteristics combined with good flexibility, and greatly-improved resistance to the melting or curing temperatures of other casting materials. If properly lubricated, they will produce more casts per mold than will glue-gelatin molds; but they cannot be reclaimed, and they have a tendency to deteriorate, or become unusably rigid after a few dozen casts have been made.

Elastomers Speed Mold Making

Latest additions to the list of flexible mold materials are plastic "elastomers" which apparently combine, and also surpass the most desirable characteristics of glue-gelatin and rubber latex. They can be made from raw ingredients into finished molds in less than three hours, whereas even the simplest glue-gelatin molds cannot be finished in less than twelve hours.

Elastomers have smooth, non-porous surfaces which ordinarily eliminate the need for lubricants such as are used in both of the other types of flexible molds. They have great chemical inertness, and have been used to make more than 1000 casts each without appreciable deterioration. Their rigidity or flexibility may be increased or decreased in conformity with various requirements, and they may be reclaimed innumerable times by melting—although they have much greater temperature resistance than glue-gelatin. See Fig. 1.

Following is a typical or basic elastomer mold formula:

25 parts polyvinyl chloride (resin)
75 parts diallyl phthalate monomer (plasticizer)
5 parts basic lead carbonate (stabilizer)

If made in small or experimental quantities, these ingredients may be mixed by weight in the upper container of a simple double boiler whose lower container has a clear, extra-heavy, mineral-oil bath. They should be agitated almost constantly until a temperature of about 325° F. is attained, then the mixture should be allowed to simmer five or ten minutes before it is poured on a pattern. See Figs. 2 and 3.

Large quantities of the elastomer ingredients may be mixed in either a Banbury mixer or a thermostatically-heated agitator; and, in any event, heating to more than 350° F. should be avoided to prevent burning.

The mold material produced in conformity with the basic formula presented here is a milk-white compound with translucency or transparency characteristics. Various powder pigments may be added to provide opacity or a different color; but these pigments are not recommended since they increase the tendency of the material to form air bubbles. However, they may be added, when and if the tendency of the material to become discolored can be

FIG. 1. BELOW, elastomer mold turned inside out to demonstrate its elasticity.

FIG. 2. At RIGHT, elastomer mold ingredients should be measured by weight, as indicated here.

FIG. 3. Ingredients of elastomer mold material are mixed and heated in a double boiler.

FIG 4. A plastic casting resin is poured into a small elastomer mold.

considered a psychological disadvantage—despite the fact that this does not represent deterioration of physical properties.

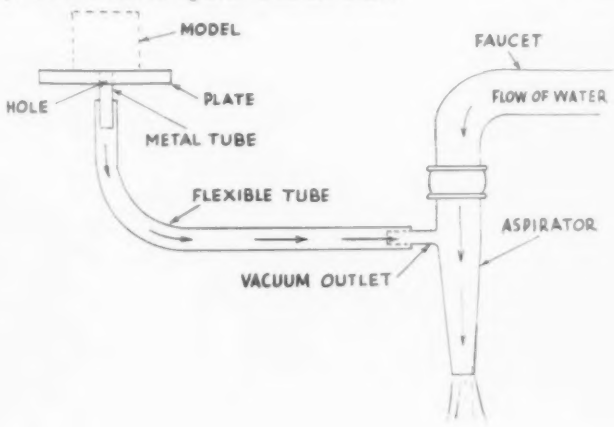
The pourability of the mold material in the molten state can be greatly increased by the addition of about one per cent linseed oil or castor oil to the initial ingredients, and the flexibility of finished molds can be either increased or decreased by respective additions or subtractions in the quantity of plasticizer used. However, if the quantity of plasticizer is reduced as much as 25 parts, the material may become very difficult to pour.

Patterns over which the molten elastomer may be poured include articles made from metals, glass, clay, plaster, wood, ceramics, and other materials which will resist temperatures of 350° F. or more. See Fig. 4.

Single-piece molds can be made regardless of fairly abrupt backdrafts or undercuts, since the molds can be greatly stretched or distorted in removing patterns or casts. Multi-piece molds are necessary only when complex pattern designs will necessitate stretching to more than three times the cast-mold dimensions, or when various parts of a pattern must be completely surrounded by the mold material, but may be fabricated by any of several conventional methods.

FIG. 5. BELOW, schematic diagram showing experimental setup for vacuum-forming elastomer molds.

FIG. 6. At RIGHT, a resin-filled elastomer mold, with plaster backing, is placed in a heat-curing oven to harden a cast.



Vacuum-Forming Technique

Non-porous patterns, such as those made with metals, should be heated to about 150° F. prior to use in making elastomer molds so as to prevent flow lines. Where plaster and other porous patterns are required, molds should be vacuum-formed. See Fig. 5.

A suitable vacuum-forming procedure is the following:

(1) Coat the model or pattern with linseed oil soap (a purchaseable combination of approximately equal parts of linseed oil, soap, and water). The "soap" may be applied over lacquer and other coatings on the pattern, if necessary, although the latter are not required.

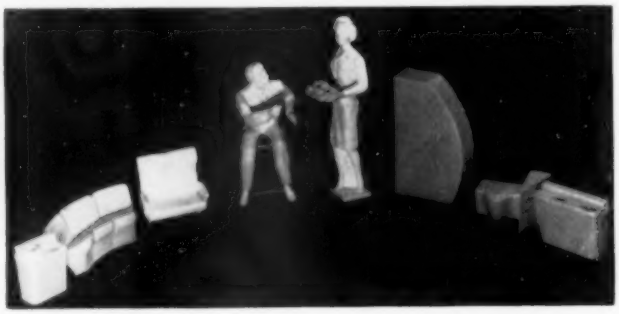
(2) Polish the pattern with a soft cloth until it has a fair luster.

(3) Position the pattern on a vacuum plate, so that hot air may be withdrawn by an aspirator or vacuum pump when the molten elastomer is poured.

In the illustrated vacuum setup, a single-hole plate and aspirator are indicated. However, better production results

FIG. 7. Elastomer molds (foreground) and some miscellaneous articles that have been cast therein (background).

FIG. 8. Phenolic articles that were cast in elastomer molds.



can be attained with a multi-hole plate whose outlets are connected with a gas-stove manifold and a good vacuum pump.

In any event, the model or pattern should be surrounded by a suitable form which will determine the outer dimensions of each mold. Cardboard, sheet metals, and many other materials can be easily made into suitable forms.

Small elastomer molds should have considerable wall thickness, so that they will require no reinforcements to produce accurate casts. Large elastomer molds may have very thin walls, since they should invariably be reinforced with plaster or some other rigid backing medium if they are to have reasonably-close tolerances. See Fig. 6.

Pouring of the elastomer should be done down the side of each form, so that the material will slowly rise and submerge the patterns.

The outer surfaces of an elastomer mold will cool to reasonable hardness in 30 minutes or less; but damage may

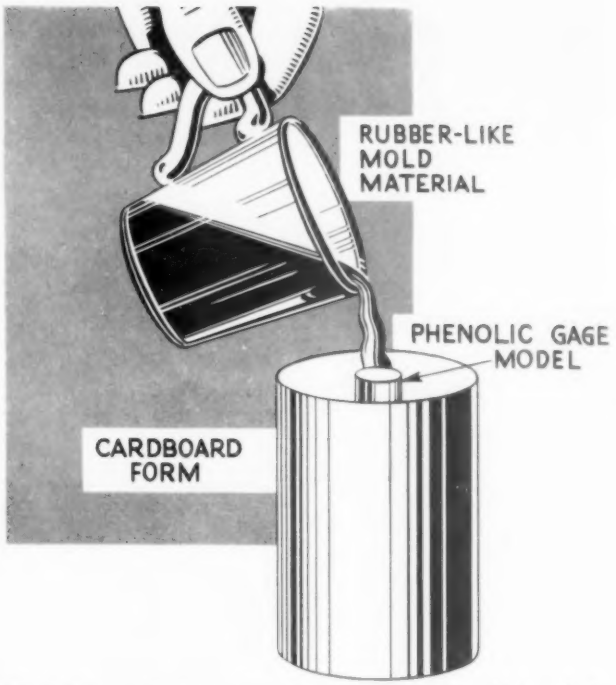


FIG. 9. Diagram showing how a rubber-like elastomer mold is made by pouring the mold material over a simple gage pattern.

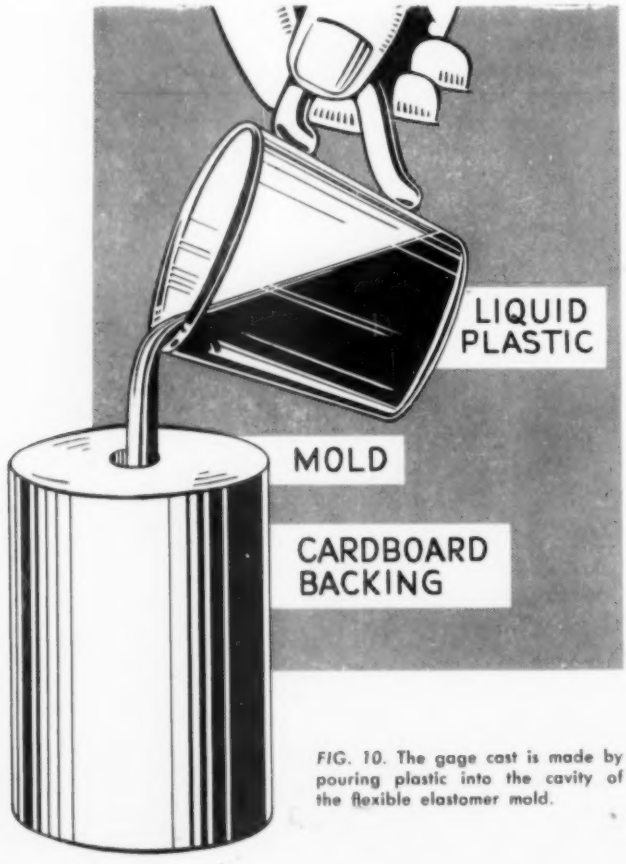


FIG. 10. The gage cast is made by pouring plastic into the cavity of the flexible elastomer mold.

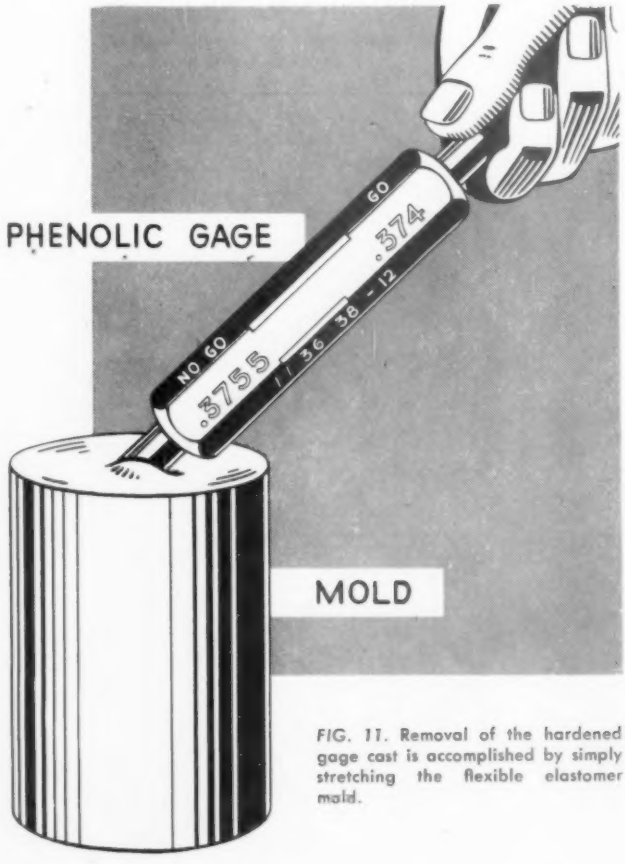


FIG. 11. Removal of the hardened gage cast is accomplished by simply stretching the flexible elastomer mold.

caused if patterns are extracted in less than two hours. The cooling process can be speeded with a cold-water quench.

Elastomer scraps on handling equipment can be readily peeled off with the fingers after they are cool.

Fabricating Tooling Gages

There has thus far been a tendency among Tool Engineers to consider flexible molds suitable only for the casting of art objects and novelties, which do not require close tolerances. However, tests have proved that low-shrinkage phenolics can be consistently cast to tolerances of .016" in the new elastomer molds; and, at one Los Angeles concern, tooling gages have been thus fabricated. See Figs. 7, 8, 9, 10, and 11.

In the latter instance, the gages are purposely cast to oversize dimensions and machined to necessary tolerances with ordinary woodworking tools. Besides costing about half as much as metal gages, the resultant products have unprecedented thermal stability for conventional factory usage, and they will not corrode.

Materials which can be cast in elastomer molds include almost everything that can be melted or cured at temperatures of less than 225° F.—e.g., numerous other plastics, waxes, ceramics, low-temperature alloys such as Cerromatrix, plaster, and wood compositions. For dimensional accuracy, probably the best material is a phenol-formaldehyde casting resin with boric-acid and glass-fiber fillers.

Original elastomer patterns can ordinarily be fabricated with greatest ease from water-type modeling clay, which should be hard—if not completely dry—when the molten mold material is poured. Where production requirements necessitate the use of many duplicate molds, the clay patterns can serve as masters, and duplicate patterns can be cast with plaster and other materials in molds made from these masters.

In several cases, elastomer molds have been used in connection with the centrifugal casting of plastics. Some distortion was observed, but it was not generally excessive.

In conclusion, it should be noted that when too much plasticizer is used in making elastomer molds, greasy exudations may appear. As a rule, these exudations will give the mold smoother surfaces and better release characteristics; but, if they should cause difficulties, they can be eliminated by soaking the elastomer mold in chloroform or some equivalent solvent. If portions of an elastomer compound should be overheated in mixing or remelting, small black impurities will be observed and should be removed before a mold is poured.

Better Automatic Welding with New "Arc" Positioner

Of interest to users of latest automatic processes of shielded metallic arc welding is a new service which provides for greater mobility and a decreasing time-loss factor. The new device, which is announced by Mark F. Gouran, Welding Engineer, 7426 Devon St., Mt. Airy, Philadelphia 19, is said to have been proven eminently successful in its initial applications to welding jobs that, in the main, were complex enough in nature to establish its mobility, time saving and high efficiency factors.

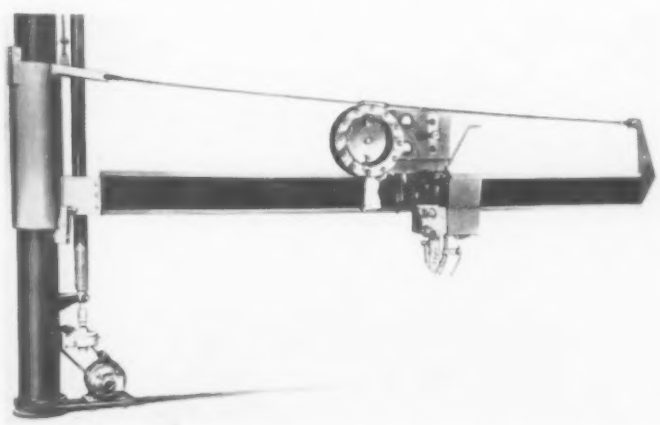
As the name implies, the Arc Positioner is comprised of an automatic shielded arc welding head travelling on a beam that encompasses a vertical zone of 8 ft., with the assembly rotating around a fixed axis to a maximum radius of 20 feet. In operation, it may be compared to a radial drill; and it is manufactured in three standard sizes providing 10, 15 and 20 ft. horizontal arc travel.

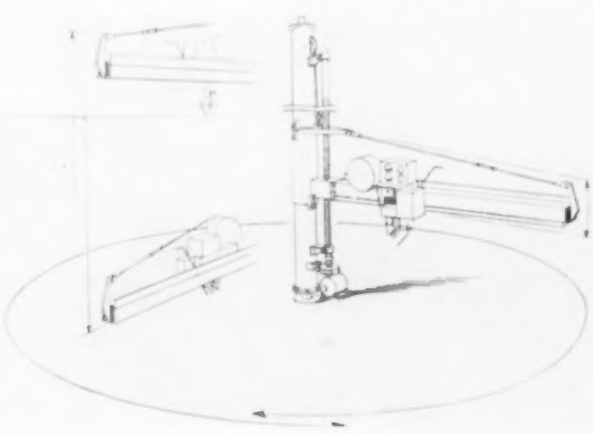
The traveling assembly is the Lincolnweld head and carriage manufactured by the Lincoln Electric Company of Cleveland, which travels on the beam to the radii stated above. The vertical travel, which is powered by a motor driven adjustment on the beam, covers the 8 ft. operating zone. Vertical adjustment is at the rate of 36" per minute, and permits inching the beam up or down to obtain the exact height for any particular welding operation. The beam may be swung manually 360° about its axis, varying in radius according to the length of the beam. Positioners of larger capacity may be had as custom-built jobs only.

While the automatic shield arc welding process provides welding speeds considerably greater than possible with manual operation, its efficiency may be considerably impaired, and time wasted, by improper handling of jobs to and from the welding line. Thus, if an automatic application, on a fixed beam, is operating at the speed of one minute per welding operation, and if loading and unloading takes two minutes, the tool would be but one-third efficient.

If, however, the work is disposed in a circle, and within the radius of the beam, then the operator can move the head from job to job, and the time loss would be confined to the brief interval of swinging the beam to the next workpiece. Thus, the shutdown time entailed by loading and unloading each station would be eliminated. Under the worst of conditions, then, the efficiency factor, with the Positioner, would be at least 66 per cent, with a higher factor possible under ideal handling conditions.

At LEFT, the "Arc" Positioner, manufactured by Mark F. Gouran, Philadelphia, Pa. The entire assembly, including the beam, head and vertical gear shaft, with motor, rotates around the axis when the operator changes from one job to another. At RIGHT, the mobility of the Positioner is illustrated in perspective and shows how three dimensional positioning of the arc can be effected, plus horizontal travel along the beam for straight line welding.





By Fred W. Steiner

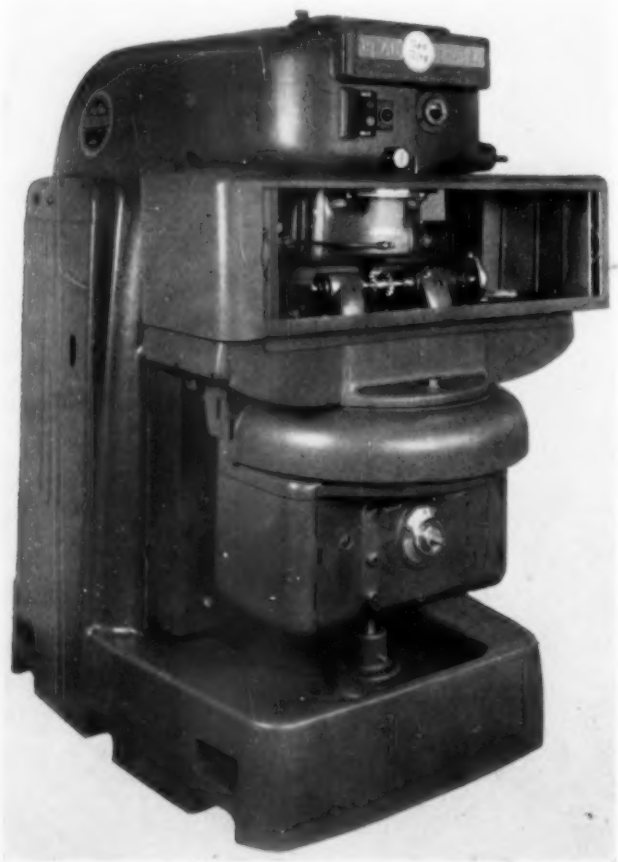
Reviews and Previews

AN INNOVATION IN GEAR SHAVING, by the National Broach & Machine Company, 5600 St. Jean, Detroit 13, incorporates a novel mechanical principle of feeding the work gear across the cutter. Work, in the new machine—called the Red Ring Diagonal Gear Shaving Machine—is fed at an angle to its axis, as compared to previous parallel feeding. The diagonal traversing of the work, under and through the cutter, facilitates the shearing action at each cutting edge and makes possible the removal of more stock per cycle, and in less cutting time.

The entire cutting cycle is confined to just two passes through the cutters; for example, the work gear on the machine (see photo) was completely shaved in 15 seconds, removing .010" over pins. Other advantages of this diagonal feed include longer cutter life, due to the fact that the full face of the cutter is effective during each cutting cycle. Therefore, the cutter face may be considerably less than the face width of the work gear; also, cutter serrations need not be staggered. There is better control of lead on helical gears; and, the danger of cutter breakage when processing shoulder gears is considerably lessened.

In the new machine, the distance between the cutter and the work gear remain constant throughout the complete run, thus eliminating the time ordinarily required to raise the knee, and to lower it for each successive loading. This constant center distance—as well as a constant backlash at loading position—gives the operator an immediate check by which he can screen out oversize gears. Should crowning be desired, the crown may be ground into the cutting tool; and, by varying the diagonal angle of feed, the amount of crown on any one gear—or group of gears—may be varied to any desired amount of the maximum crown in the cutter.

Red Ring Diagonal Gear Shaver



Although no change has been made in the already successful principles of rotary crossed axis gear shaving, or in the positioning of the cutting tool above the work gear, this new Diagonal Gear Shaving Machine has been built considerably heavier, and more rigid, than previous machines of its type. Power has also been stepped up, all of which results in greater productivity, especially when a large volume of gears having the same characteristics are to be shaved.

ALSO INTRODUCED by National Broach & Machine is the new Turmatic (not shown) which has been engineered with special regard for high production operations. Instead of the usual one cutting and two work stations, this latest addition to the Red Ring line has two cutting stations and four work stations.

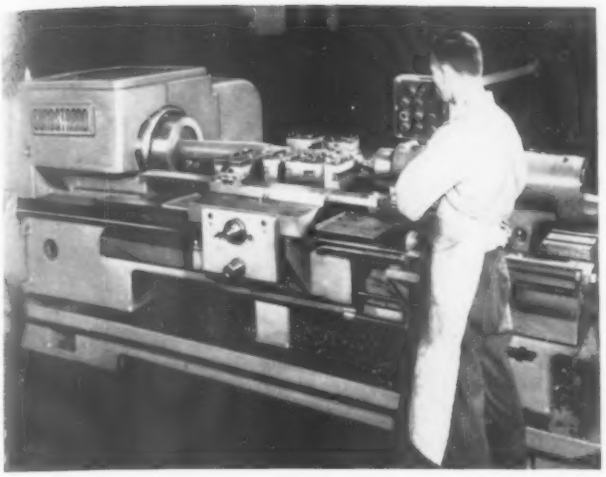
The Turmatic has a central 4-sided turret, equipped with four sets of head and tailstock combinations which carry work gears with their axes vertical. Two cutter heads, traversing across the work gear faces (as in previous Red Ring shavers) are spaced 90° apart and automatically move the shaving cutters simultaneously into mesh with their respective work gears on adjacent turret faces.

After completing the cutting cycle, the cutter heads automatically back out of mesh and the turret indexes 180° to present two fresh gears to the cutters. As long as each work station is properly loaded with gears of the correct size, actions of both the turret and cutter heads remain fully automatic. Time, between the end of one cutting cycle and the beginning of the next, is only about four seconds.

A nose piece, which positions the gear when loading, automatically rejects oversize gears, thus eliminating the need for opening and closing the guards, or to reach around behind the work gear in order to correctly position it. Loading has also been reduced to four motions on the Turmatic, as against 8 to 10 on previous single station machines.

A NEW AUTOMATIC LATHE—Model 16—has been added to the line of production lathes manufactured by the Sundstrand Machine Tool Company, Rockford, Ill. While embodying most of the basic design features of the Sundstrand Models 8, 10 and 12, the new machine (shown on next page) has increased capacity; and, swinging 17" over the slides, will take a 21" chuck. It is powered by a 75 h.p. motor, and is available in three bed lengths—36", 60" or 84" between centers.

Both the spindle and front carriage drive units are provided with two different driving gear centers, a feature that, in each case, provides an increased range between high and low spindle speeds and low front carriage feeds. In addition, the number of speeds and feeds obtained from one set of gears are doubled. The rear carriage is adjustable full length between headstock and tailstock centers. Screw feed is provided to the front carriage, while the rear carriage and tailstock are provided with rack and pinion adjustment. The tailstock is power operated for speed and convenience when loading heavy workpieces.



The Sunstrand Model 16 Automatic Lathe

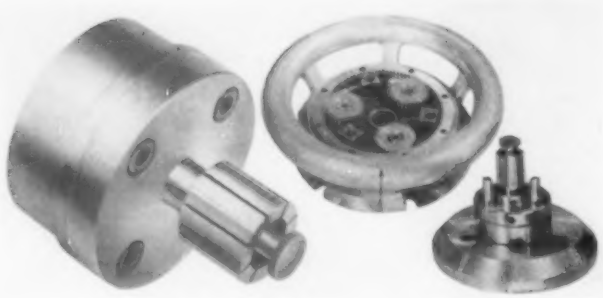
A quick cycle changeover provides for multiple tooling for short runs as well as for production turning, and the machine is equally suited for chucking operations and shaft turning. Complete control of all cycles is provided by adjustment dogs on a cycle control disc; therefore, the making of cams for cycle control is eliminated. Lengths of rapid approach, feed and rapid return strokes are had by merely changing the position of the dogs on the disc. This simplifies cycle setup and changing from one turning job to another.

The entire machine cycle is controlled through push buttons, with a pendant control provided for ease of operation when turning large work. Also provided is automatic de-clutching between spindle and spindle motor, with self adjusting magnetic brake for quick stopping of spindle rotation. As engineered and built, the machine is amply rugged, and amply powered for multiple turning operations and for high production turning with carbide tools.

CUSTOM-BUILT Precision Expanding Mandrels have been recently introduced, as additions to their standard mandrel line, by Erickson Tools Div'n, Erickson Steel Co., 2309 Hamilton Ave., Cleveland 14. Features include locating or driving pins, which can be added since they are often interchangeable and may be of various lengths. Handwheels are also available, as are spline, hex, square or step type sleeves.

All essential qualities of the Erickson standard line have been retained. These include guaranteed accuracy of .0005" and a vise-like grip, on interior surfaces, throughout the expansion range of 1/32". In addition, many sizes of sleeves in increments of 1/32" are now available for each model of shank.

ALSO, TWO LARGER SIZES of air-operated chucks have been added to the Erickson line. Model No. 5-1-AT has ranges, in 1/32" steps, of 1⅝" to 1", 31/32" to ½", 15/32" to ¼"; and also 1⅜" to ¾" hex in ⅛" steps. The other new model, No. 601-AT, is available in 1/32" steps as follows: 2⅛" to 1½", 1-15/32" to 1"; 31/32" to 11/16"; and also 1⅞" to 1⅜" hex in ⅛" steps.



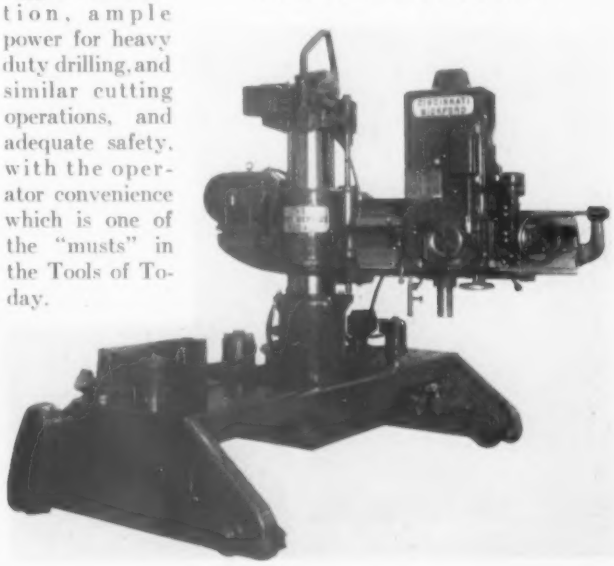
The same claims are made for these two new chucks as for the Erickson line, as a whole, namely: collapsibility range of 1/32", replacing seven standard single-purpose collets; and uniform grip along entire length of collet which makes possible the holding of a variety of materials including glass, gold and ceramic tubing for second operation work. Design effects a marked reduction in breakage of tools and damage to parts on drilling, buffing, polishing, honing, and other operations. Greater feeds and speeds are also possible, while setup time is markedly lowered and rejects greatly reduced.

THE SUPER SERVICE RADIAL DRILL, manufactured by the Cincinnati Bickford Tool Company, Cincinnati, Ohio, is now available with a prefabricated steel gondola base. The base, which is 110⅛" wide, is provided with four hardened steel flanged wheels, for track mounting; has power clamping, and power traverse (24" per minute), with push button control located at the head of the machine.

Except for the new base, and a shortened column, the machine is standard C-B design with a 4 ft. arm. A heavy lifting bail, attached to a steel cap, is provided for crane lift and intra-plant transportation. The base incorporates a coolant pump and tank (shown at left); in addition, jacks are provided for levelling and raising the wheels from the track or floor, as the case may be.

All controls, for drilling, are centered at the head. This includes instant selection and change of 36 spindle speeds and 18 feed rates, power clamping to the heavy 13" diameter column, controls for power arm elevation and power rapid traverse of the head. Safety features include a safety elevating nut, so that the arm cannot drop even though the nut should be completely stripped—a remote contingency. All told, the Super Service Radial Drill combines advanced engineering with rugged construction, ample power for heavy duty drilling, and similar cutting operations, and adequate safety, with the operator convenience which is one of the "musts" in the Tools of Today.

The new Cincinnati-Bickford Drill



By Vaners Borg

"News" in the Welding World

Summary of Current Developments in Welding Accessories and Electrodes

ANNOUNCED BY THE *Control Division, General Electric Company*, is a new line of non-synchronous electronic resistance Welding Control Combinations designed to meet NEMA standards and which includes combinations of ignitron contactors and sequence-weld timers. The whole is mounted in a single cabinet and may be had with, or without electronic heat control.

Although designed for right-hand side mounting on a welding machine, the control cabinet may be mounted on a wall or balcony, or on the floor. When mounted on the welder, it is only necessary to connect air, water and power for a complete installation.

Also, by *G-E*, is a new Electrode for welding cast iron when the weld must be machineable. Designated W-2075, the new electrode is composed of pure nickel core wire, and an extruded black covering that is largely consumed in the arc and which produces very little slag. The arc stabilizing ingredients used in the covering of the electrode, which may be used in any position, make it particularly useful on a.c. and d.c. (reverse polarity).

By *The McKay Company*, Pittsburgh, a new d.c. reverse polarity arc welding Electrode—named "Hardalloy"—that provides weld metal which is highly resistant to impact or abrasive wear, and is therefore particularly applicable to hard-surfacing applications. The metal, as deposited, tests 59.0 Rockwell "C" scale, and can be heat treated for machining or grinding, with subsequent re-heat to restore it to as-deposited hardness. Available in five sizes from 3/32" to ¼".

By *Westinghouse Electric Corporation*, Buffalo, a line of synchronous-precision, a.c. resistance Welding Controls in a complete, unified, factory assembled "package," called Synchro-Trol. Key to the unit are eight factory assembled sub-units and five supplementary sub-units from which it is possible to make hundreds of combinations for timing and sequencing. The unit—which permits of easier installation, since it eliminates complicated mountings and multiple connections between the conventional contactor, weld timer and sequence timer—may be side-of-welder, or floor mounted.

Also announced, by *Westinghouse*, is a new "Flexarc" limited-input type Welder, which is a general purpose transformer arc welder designed for use on single-phase power lines of limited capacity. The welder, which comes complete with all necessary connections and an insulated electrode holder, may be had in three output ratings—130, 160 and 180 amperes.

Westinghouse also announces a new Electrode, DH-MO, designed for high speed welding of grooved joints, positioned fillets, and horizontal fillets. Welds made with DH-MO meet requirements of AWS-ASTM tentative specifications for iron and steel arc welding electrodes, classification E-7020.

By *All-State Welding Alloys Co., Inc.*, White Plains, N. Y., two new nickel-silver alloy Welding Rods which have been added to the A-S line of low-temperature welding and brazing alloys and fluxes. One of these is recommended for production and fabrication of light steel and nickel alloy sections; and it is suitable for low-temperature welding of steel, stainless steel, copper-nickel, and copper. The other is recommended for welding worn or broken parts, or whenever resistance to frictional wear is desired.

Also, by *All-State*, a new Aluminum Flux for brazing sheet aluminum. This flux has a low melting point—around 950° F.—and becomes quite active at 1,000° F. One feature is that it breaks down completely into a liquid state, and therefore provides excellent capillary action to the aluminum brazing alloy. If, while still hot, the welded parts are submerged in hot water, nearly all traces of flux are removed.

An Electrode Holder—"Little David"—announced by *The Lacey-Webber Company*, Kalamazoo, Mich., is a new, lightweight, tong-type holder rated at 350 amps for rods up to and including ¼", which operates with a rise in temperature of only 50° F. The holder is made of copper bearing aluminum alloy of the type generally used for aircraft production, thereby combining strength with lightness.

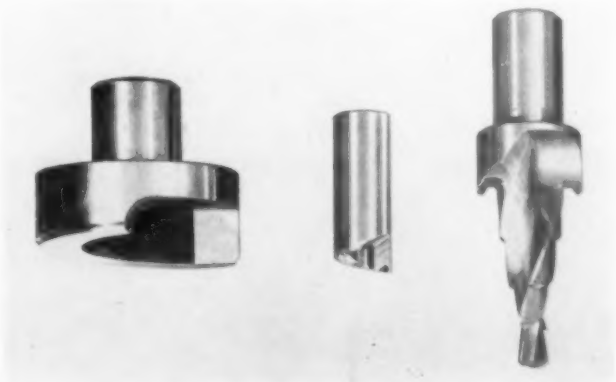
Because of light weight and better balance, together with a spring and lever ratio designed for greater leverage, operator fatigue has been greatly reduced. A fully insulated single leaf spring eliminates cups and coils; and slip-on insulating covers protect both operator and equipment.

By *G. W. Smith & Sons, Inc.*, Dayton, Ohio, a new, improved Arc Welding Compound developed to produce cleaner and better welds. It is an electrically conductive composition of inorganic materials which supplements the fluxing action of the welding rod coating; quiets and stabilizes the welding arc; reduces arc breakage; improves fusion and prevents scale on both sides of the weld bead. It also prevents adhesion of weld spatter and thereby eliminates spatter-cleaning operation.

Spiral Form-Ground Tools

USING EQUIPMENT designed by their own engineers, exclusively for the Company's use, the J. & S. Tool Company, of East Orange, N. J., now form-grind spiral form tools and spiral fluted form drills to customer specification in unusually few man-hours. The grinding technique employed in this shop is the outgrowth of years of concentrated experience in form-grinding operations.

Spiral form tools are rated highly by many manufacturers, for their exceptionally long life, strength and free cutting qualities. Hitherto, however, their high cost has made extensive application impracticable. Improved methods of the J. & S. Tool Company have so greatly reduced their cost that they are now put within the reach of a much wider segment of industry.



Drilling and Boring Tools

Installment No. 10 of a Series

IN THE PRECEDING installments, this series, we confined ourselves largely to drilling operations and the tools incidental thereto. We now turn to precision boring and hole finishing. First, however, we will discuss "precision" for the practical purposes of this article.

Precision is a variable term, with different meanings in different trades and vocations. Thus, 1/16" may imply precision to the carpenter or structural steel worker while, to the tool engineer dealing with the mass production of interchangeable parts, it may range from 1/16" (for hold-down holes) and 1/32" (as for mating holes in parts for riveted assemblies) down to .000001"—that is, to the micro-inch, which has latterly been established as the "zero" in measurement.

In addition to comparative dimensional precision, we also have comparative precision in surface finish. Here, too, the micro-inch has been accepted as zero. In precision hole finishing, both factors must be taken into consideration. In this connection, however, it should be understood that nothing is to be gained by going to extremes, either in dimensional quality or degree of surface finish. If limits of tolerance are specified as plus or minus .010", anything within that range is acceptable, but if limits are established plus or minus .00001", then anything beyond that range may be rejected.

For dimensional control of bores, we have inside calipers, inside micrometers, dial indicator bore checkers (now available in ranges from 3/16" minimum and up) and cylindrical plug gages. We also have air and electrical inside measuring instruments of the comparator type; and these instruments, collectively, range in accuracy from "near enough" to the accepted zero.

For control of surface finish, we have surface analyzers, optical comparators, and surface finish standards. Thus, having an accepted norm, we can duplicate surfaces within the limits of tolerance specified—as, for example, 3 micro-inches RMS (root mean square).

So that the reader may fully understand the relationship of diameter to surface finish, it may be pointed out that while two mating parts—as a bored cylinder and a piston—may be machined to extremely close limits of tolerance, the surfaces may be so rough, comparatively, when viewed under the microscope, that rapid wear would result in operation. This is best illustrated in Fig. 1, where the surfaces may be assumed to be within .000005", or 5 micro-inches. The line running through the serrations may be assumed as denoting the mean diameters of both bore and piston. Note the peaks and valleys.

To overcome this roughness, micro-finish—or, to use the trade name adopted by the Chrysler Corporation, "Superfinish"—was evolved. This presumes honing the surfaces to level the high peaks, leaving only the valleys, as shown in Fig. 2. At time of writing, this may be considered to be the ultimate in surface finish; and, all other things being equal, parts so processed may also be said to represent the ultimate in wearing quality.

For hole finishing, we have our choice of the following methods: (1) drilling; (2) reaming; (3) boring and (4) honing—each of which may be a final operation depending on the degree of accuracy and surface finish required. Here, we are not overlooking broaching as a means of hole finishing; it's just that broaching is outside the scope of this particular discussion.

Under the best of conditions, drilling can only be comparatively accurate as regards diameter, hole spacing and surface finish. Provided that the reamer is concentric and ground to size, and further provided that alignment is accurate, the reamed hole may be considered accurate enough for most purposes, both as regards diameter and surface finish. But, since the reamer follows a drilled hole, hole-spacing can only be slightly more accurate than the original drilling.

As far as mean dimensional accuracy is concerned, there is little choice between precision boring and honing, except as the latter may be a finishing operation purely and simply, after boring, and therefore productive of a superior finish. With the jig borer, one obtains the ultimate in precision hole spacing, while any of the precision boring machines will produce holes to required dimensional accuracy and, in most cases, to required surface finish.

The foregoing explanation has been deemed necessary since, to be able to anticipate effects, one must have an understanding of the limitations of different methods and of different tools. We will therefore devote the balance of this installment to those fundamentals which will provide a better understanding of the methods employed.

In a preceding paragraph, we mentioned alignment as one of the requisites for accuracy in reaming. To use a simple

FIG. 1.

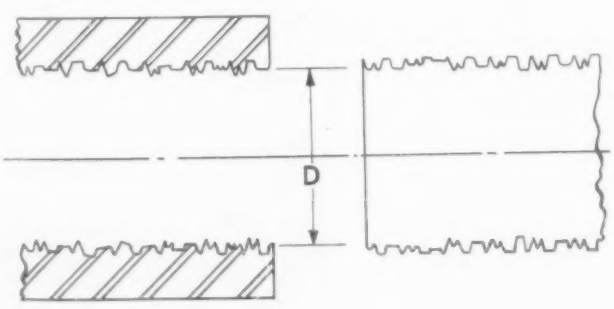
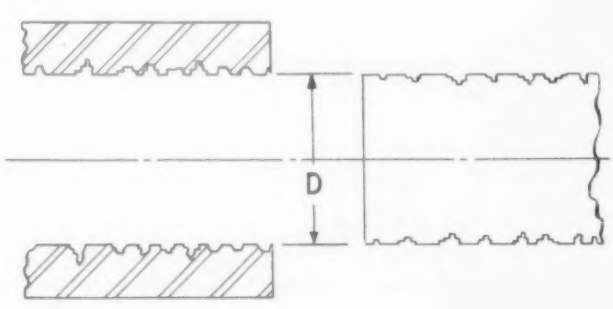


FIG. 2.



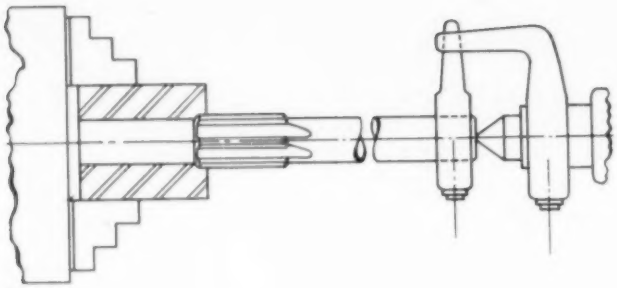


FIG. 3.

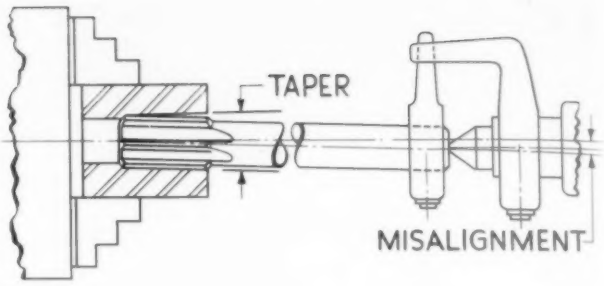


FIG. 4.

illustration, consider the part being reamed in a lathe, as in Fig. 3. The tool is a chucking reamer, held against the tail center and kept from turning by dogs on the reamer and the tailstock spindle.

Assuming that the hole has first been drilled, there is the probability that there will be a slight runout. If the hole is now reamed, it will taper in ratio to the runout; thus, if the runout is .010", and the reamer is 2½" long, the taper will be .020" approximately, for the length of the flutes. At the start, all teeth will cut; but by the time the heel enters, only two or three teeth will be cutting, on one side only.

Therefore, it is best to first bore the hole with a single point tool, slightly smaller than finish size and for a short distance in. The reamer will then start without the wobble that results in taper. It is also essential to a straight hole that the tailstock of the lathe be dead in line with the spindle. Else, there will be a tendency to "climb," which also results in a taper. See Fig. 4 which exaggerates the condition when centers are out of line. In this connection, hand reamers are not ordinarily recommended for machine reaming, except for short holes. The longer the reamer, from cutting lips to heel, the greater the taper in event of misalignment.

It is not to be inferred from the foregoing that reamer holes are not smooth or accurate. For mass production runs, whether for single or multiple hole finishing, few tools will duplicate size and finish quite so consistently or with such marked economy as the reamer. This is especially true since the introduction of carbide blades in combination with alloy or high speed steel bodies. And, given an accurately bored fixture, spacing of multiple holes will usually be within all reasonable limits of tolerance.

Inaccuracies, when reaming through a bushed fixture, can result from various causes. Such as misalignment, as previously stated, and wear of side cutting edges as well as of bushing walls, which results in play. In this connection, a reamer may wear as much from rubbing against a hardened bushing as from actual cutting.

Where space permits of their installation, therefore, rotary bushings are recommended over solid bushings; however, commercial solid bushings are so inexpensive, and so quickly replaced, that it is poor economy to continue their use when once worn. Misalignment, in turn, can be compensated for by resort to a floating holder, of which a number are commercially available.

For extreme accuracy, however, the single point boring tool is the logical choice. When used in combination with a precision machine (Fig. 6), one will obtain holes that are consistently straight or tapered, as the case may be, and consistently round and of good finish.

An essential, in the use of single point tools, is extreme rigidity. The holder, or bar, should be as large in diameter as possible, consistent with room for chip clearance; and, there should be a minimum of overhang of the cutting tool. To provide chip clearance, the bar can be relieved, as shown in Fig. 5—which, incidentally, shows a typical single point boring tool.

In precision boring, care should be taken during the final cut to hold the workpiece as lightly as possible lest, when unclamped, it spring out of round. And, whatever type of tool is used—high speed steel, cemented carbide, or diamond—it is well to remember that the best surface finish, as well as the greatest accuracy, results from a combination of the highest practical speed with the slowest possible feed. Usually, however, the ideal condition for a given job will be found between these extremes. Of that, more in the next installment.

End of Part 10, this series. Installment No. 11 will follow in the June issue, The Tool Engineer.

FIG. 5.

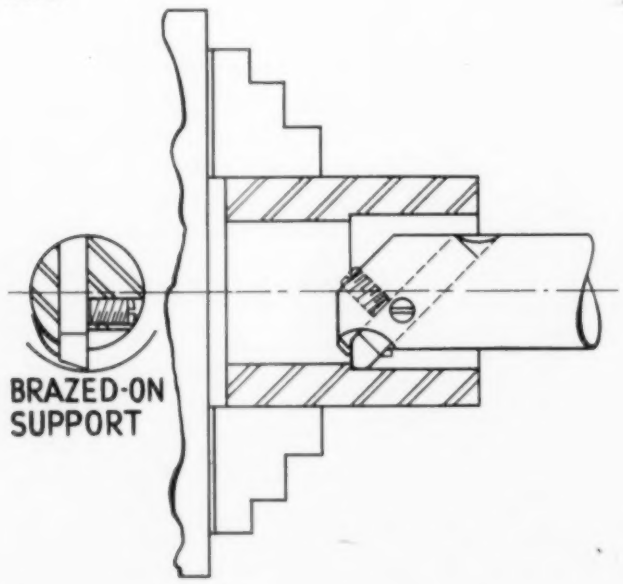
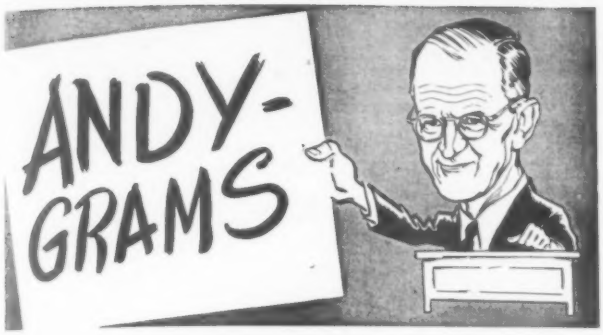


FIG. 6. Boring piston pin holes on Ex-Cell-O Style 1212A Precision Boring Machine. Photo by courtesy of Ex-Cell-O Corporation.



SO MANY THINGS have happened, the past month, that I can only hit the high spots of the '47 Annual along with mention of a few names out of hundreds. For the real low-down, see Doris Pratt's review in the ASTE News. Maybe you'll be in the pics! And if you weren't there, your delegate or attending Chapter buddies will paint a glowing picture, anent which I noticed some very complimentary comments in the April meeting bulletins of Detroit and Cleveland Chapters.

To me, after an absence of several decades, Houston exceeded all expectations, about the only familiar things being the traditional southern friendliness—and, I may add, the usual warmth and sunshine. Registration at the Rice, and the pleasure of meeting old friends and making new ones. Margaret Amis, no doubt the pin-up girl of North Texas Chapter, and Betty Buckeye, also a vision of loveliness of whom I'll give you a glimpse (see pic). Local beauty had plenty of competition a/c so many of the boys had brought their wives (singular implied) along, something I've been wanting to do these many moons.

Chris Vogt and Homer Briggs who, with their fellows of the Host Chapter, vied in making things pleasant for the visitors. Rip Collins and Red Cole, both models of the typical easterner's concept of the typical Texan. Met James Walker, who is writing a series on Die Design for *The Tool Engineer*, and Walter Brooking, dean of LeTourneau Technical Institute of Texas, to whom you may look forward for an interesting article on tool engineering education. Fine men, all of 'em.

Until the late hours, sitting in with the Editorial Com'tee, ably ch'manned by W. B. McClellan and attended by Herb Tigges, John Lapham, Bob Powers, Clarence Etter and Irwin Holland who, as 1st V.P., now has *The Tool Engineer* under his jurisdiction. The Committee has worked hard and conscientiously to produce an outstanding magazine. The meeting over, Java and sinkers at the Greek's, then to bed.

Up betimes and rarin' to go, but never got far before being stopped by one of my 18,000 bosses, the most of whom had nothing but the highest praise for the magazine. Seems that what the boys like is the segregation of advertising and editorial matter; that way, the reader can concentrate on each in turn. And we must be right, considering that other publications are now following suit.

With Art Denis, of L.A., in quest of a spot o' brew, only they don't sell before 11 A.M. or after 11 P.M. Texas is fence country now. Vic Ericson and Carl Lindegren from Worcester; the delegation from Rochester, Elmira and adjacent points, including Jim Horn with whom I relayed greetings to old friends from Providence—Harry and Mrs. Flodin—now resident in Rochester. Dick Smith from Hartford; Joe Duncan from Minneapolis; Ben Hartsock from Peoria, Milt Kline from Ft. Wayne and Harry Whitehall from Hamilton—North, East, West, South, all roads led to Houston.

Ch'f Justice Joe Siegel and three of the "nine old men"—Bill Smila, Bert Carpenter and Frank Curtis—who make up the Judicial Com'tee. (Where were the proxies?) Doc Osborn of Ohio Crankshaft's Tocco Div'n, of whom I'd heard a lot of nice things. Good man for anyone's money. An interview by a local leg man, as a result of which I got in the papers along with the brass.

Thurs. nite, Public Relations D'r Jno. Cannon sat me in on one of his publicity sessions. The guy's sure getting publicity for us! Had my pic taken along with Howard Campbell of *Modern Machine Shop* but, as it turned out, it didn't jell. Jim Linsley of *Iron Age*, and Guy Hubbard of *Steel*, along with other scribes, including Carl Harrington of *Mill & Factory*. ASTE doings are big news, these days.

Friday nite, the membership meeting and installation of officers. As expressed by Al Sargent, dynamic retiring Prex, we now have about the best balanced Directorate and group of officers that, so far, has headed the Society. That is, every man has been stepped up after years of service in Society work although, as far as that goes, each of the incumbents is outstanding as regards ability. Personally, I'd pin a medal—or a bouquet of orange blossoms—on Exec. Sec'y Harry Conrad. The guy's right to the dime.

Saturday, the Rodeo—and was that a gathering of the mavericks! Riding out with Bert Carpenter, got to the ranch in time for a browse around the corrals and a preview of the contestants, the most of 'em lean and bandylegged just like you see in the movies. At that, it was hard picking the waddies from the ASTEers, what with Art Nichols and others all togged out in blue jeans, ten gallon hats and tooled boots. As a matter of fact, one of the waddies entered one of our past Prexies (won't mention names except to say he's good looking, tops 200 and hails from New England) in the bull rasslin' contest. (He was proxied.)

As for the rodeo, I've never seen so much bull throwing in my life! And it's not so one sided, considering that the cowboy isn't always a winner in a game that'd scramble the innards of anything short of an India rubber man. Yea, hombre! At that, I opine that the calves were glad to call it a day when the game was over. Nothing like too much of a good thing.

Up betimes, Sunday A.M., for an early start for N'Orleans. Had arranged to go with Jack Page, of N.O., who was driving, but had to change plans at the last minute. On the train, found myself in company with Fred Schmitt of Chicago, Floyd Allen of Elmira and Chet Morey of Boston. The result, several hundred miles of interesting conversation from which I learned a lot.

Endless stretches of flood waters; ditto cane fields, all plowed and ready to produce sugar. (Maybe we'll get an extra lb.!) Crossed the Mississippi via ferry at Baton Rouge and, what with a high wind, Old Man River was kicking up plenty. The 32-story State capitol, looming like an obelisk; an oil refinery that is an industrial city in itself. A giant rousing from a long sleep, the South is making a successful bid for economic parity.

They may close Houston up at 11 P.M., but New Orleans seems to operate on a 24 hr. schedule, seven days a week.

Bars wide open for those who want to imbibe. I'd barely got into my room, at the Roosevelt, when Johnny Cannon—who'd flown in—rang me up to sit in on another of his publicity sessions. Next time I'll travel incog although, at that, I'm always glad to help out a willing worker.

It had rained all day Sunday, but Monday dawned bright and sunny, so I headed for the French Quarter which, as I'd heard, housed enough old guns to stock an arsenal. But, the rumors were greatly exaggerated and, where any were to be had, the prices were out of line. However, it was an interesting tour even though only the ghost of Jean Lafitte swashbuckled along Pirate's Alley. *Beaucoup* local color. Outside of the French Quarter—now practically a museum—New Orleans is a modern, bustling city that, like Houston, Dallas and Ft. Worth, has become an important cog in the American industrial machine.

That night, bidding the South *adieu* but not *adios*, I boarded the Panaman and settled back to watch the landscape slip by. Lake Pontchartrain, a vast sheet of water on which, here and there, floating islands bobbed on the waves. Long stretches of pine arrayed in ghostly Spanish moss; shack villages, with the homes of the under-privileged leaning to all points of the compass. And that's not typical of the South; we have 'em in Chicago and Detroit—yes, in the very heart of the nation's Capital.

Awoke next A.M. with anticipation of budding spring, but, what a well of a heather I ran into! Worst blizzard of the year, and just onedamthingafteranother ever since, including floods. Oh well, two years from now we convene in Los Angeles, Anton Peck having done a bang-up sales job for the Golden West. And in October we meet in Boston, and next spring the big ASTE Tool Show in Cleveland. We get around!

Back on the job to find that editorial associate Fred Steiner and my Sec'y had indexed several thousand catalogs, a job we've been trying to get at for over a year. Swell! We can now give you boys North, East, West, South a better service on info. Anent service, I casually mentioned in the Column, sometime ago, that some manufacturers were looking for agents and some agents for lines to handle. Now, the boys are taking me up, so, if you're looking for line or outlet, let me know and I'll try to work out connections. Just don't crowd a guy too hard.

Among a flood of releases, awaiting my attention, is an account of an Industrial Public Relations Ass'n, of which V. W. Palen, of North American Philips Company, is chairman *pro tem*. Included is a code of ethics that, among other "don'ts," lists the following recommendations:

"Never doublecross an Editor by sending a story he has had previously. . . . Do not exaggerate a story. Keep it factual. . . . Avoid distributing stories which are trivial. . . . Don't insult the Editor's intelligence."

Well, personally, I've no particular complaint about the ethics of publicity agents although, in their zeal on behalf of their clients, they will slip in a thinly veiled "repeat" now and then. The fable about the boy who cried "wolf" still has its moral. Speaking for myself—and, I believe, for most editors—I like copy double spaced and confined to the main item, which is the product. And, we prefer glossy photos to electros a/c we can crop to size besides which, printing on good paper as we do, electros seldom compare in quality with our standard engravings.

Since Mr. Palen asks for it, I would further suggest that agents make sure that their clients' addresses are plainly stated on the copy. Right now, we're holding a number of releases—and really good stuff—that tell everything except the address of the makers who, since they aren't listed in *Thomas' Register* or in the advertising pages of current magazines, must be new concerns. But then, maybe the agencies were new, too. We live and learn.

At time of writing, Henry Ford has been laid to final rest; like Lincoln, he now "belongs to the ages." For each was an emancipator—Lincoln from human bondage, Ford from the bondage of isolation and poverty. True, there are still peoples who are enslaved, and all people are not economically independent. But, the principles of freedom have been laid down, and humanity now lifts its eyes to the goal with hope of ultimate attainment.

Literally, Ford put a world on wheels and, in the field of transportation, put the poor man on a par with the rich. He inspired—forced, rather—the development of machines to reduce toil, and set the pace in a living wage for the masses of labor. He reared the world's greatest industrial empire and, in the rearing, made many men colossally wealthy and masses of men economically independent. Yet, the wealth that he might have accrued for himself went back into industry to provide more employment for the masses and more wealth for the world.

Of course, all of these things have been said before, and far better than I can say them in the few lines at my disposal. Truly, few men have been so publicized during life, or so extolled when life was done. And, few kings or potentates, lying in state, have drawn such masses to a bier. Yet, Henry Ford was a simple man with a simple but fundamentally sound philosophy and strong but simple faiths. He believed in the dignity of work, had faith in our country and had the vision to see far horizons through the murk of temporary strife and dissension. This too, "shall pass away," but the work that Henry Ford has done shall endure.

We can all have faith in America although, right now, a lot of us may wish that our solons would throw the other shoe so's we can settle down to business. Oh sure, there are the doubting Tommies, but industrialists as a whole strike me as being highly optimistic albeit, like all progressives, they're impatient with delays. Stores are jammed with buyers, and there is a demand for consumer goods that breaks all precedent. There's only one way to meet that demand, and that is to produce.

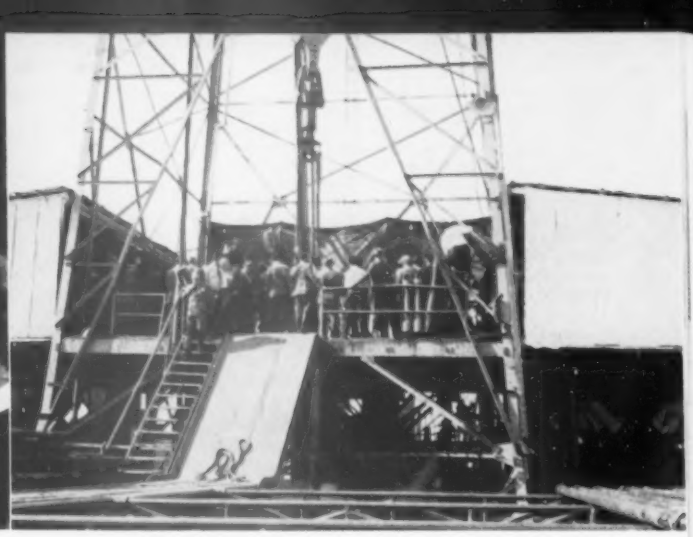
A while back, machine tool builders were plenty perturbed over surplus machine tools, yet, they're planning a machine tool show, to be held in Chicago next September, that will probably beat all records. And next spring the ASTE tool show in Cleveland will draw buyers from the far reaches of the world. And that's optimism, but optimism based on a sound premise—an absolute confidence in better things to come.

The Questionnaires—"What I like to read in *The Tool Engineer*"—are still coming in, with the order of subject preference remaining about as last stated. And they're not all from the States or Canada, many coming from abroad. One signed by Andrew Pettican of the Metal Box Company of Africa, Ltd., came all the way from Cape Town, S. A. It's "one world" as far as the tool engineers are concerned. One thing I've noticed, though, and that is that the old timers in the Society have been conspicuous by their absence, from which we may infer tacit approval of our official publication *as is*.

As I write, Clarence Etter (our advertising mg'r) came in to say *au revoir* before making the rounds of *The Tool Engineer* advertisers in the East, apropos which I relayed greetings to various friends and acquaintances throughout New England. As I've said before, Clarence is a swell guy who usually finds the welcome sign out wherever he calls. But then, why not? He represents a friendly magazine—the official publication of a friendly Society.

Yours ASTEely,

Andy



A·S·T·E· NEWS

Top: Houston convention registration begins with rush, nearly everyone arriving before opening session. Right: A 7100-foot drill pipe is hauled up to replace the bit boring this oil well. Below, upper: Probing industry's problems are H. E. Linsley, *The Iron Age*; C. A. Vogt, Houston Chapter; Guy Hubbard, *Steel*; and Howard Campbell, *Modern Machine Shop*. Bob Brooks of KTRH emcee's broadcast. Center: Chic fashions are modeled for the ladies at style show luncheon. Bottom: Bronc busting thrills rodeo crowd. (Oil well and rodeo photos, Clare Bryan, Chicago.)

Houston Highlights

Texas Meeting Broadens Professional Horizon

WITH VISITORS from the nearest Chapter at Dallas coming 300 miles and those from Seattle, the most distant, journeying 3000, the Fifteenth Annual Meeting at the Rice Hotel, Houston, Texas, March 19-22, established a record for travel to a Society convention.

But the 761 registrants felt amply repaid for their long trip by the unique program, the warm, friendly hospitality and personal thoughtfulnes of the Houston Chapter Committeemen and the opportunity to see one of the country's most ambitious and progressive cities.

Even the weather man cooperated, dealing out topcoat temperatures for the first day's indoor program, then turning on the bright Texas sun with varying intensity to suit the outdoor events of the three subsequent days.

A distinct departure from other years, the technical program, accenting in lectures, films and plant tours the extensive and precise tooling required for the oil industry, was a revelation to most of those present.

From The Texas Company's dynamic, 300-word a minute Assistant to the Vice-President, A. A. Nichoson, and W. C. Lockwood, Engineer Specialist in the Technical and Research Div., the engineers had a comprehensive non-technical description of the search for oil, its recovery from the earth and the processing for its numberless uses.

The manufacture and use of geophysical instruments for prospecting and pre-

Below: From this bower of azaleas in H. R. Cullen's gardens, the visiting engineers' wives get a foretaste of spring. River Oaks Garden Club member, facing group, serves as guide. Bottom: ASTE Officers and Directors entertain Houston executives and convention speakers at Executives Luncheon in Houston Country Club. Dr. John J. Caton (end of second table from extreme right) was principal speaker at function

ASTE Directors and Officers hear a committee chairman's viewpoint on subject under discussion. From lower left: A. M. Schmit, H. E. Collins, W. A. Dawson, V. H. Ericson, G. C. Johnson, (stenotypist), A. M. Sargent, W. B. Peirce, I. F. Holland, R. B. Douglas, H. E. Conrad, C. V. Briner, G. S. Wilcox, Jr., and C. B. Cole. A. J. Denis is temporarily absent. Also present were Committee Chairmen: R. H. Morris, W. B. McClellan, H. D. Hall, J. A. Siegel and W. H. Smila, and Vice-Chairmen H. F. Volz and H. B. Osborn, Jr.

cision instruments employed in oil well surveying were explained by J. H. Dunaway, Sr. Research Geophysicist, Humble Oil & Refining Co., and I. K. Fussell, Production Engineer, Schlumberger Well Surveying Corp. Location of oil bearing structures with the gravity meter and reflection seismograph was described in detail. F. Goldstone, Chief Geophysicist, Shell Oil Co., was the keynote speaker.

Valves and meters, two other requisites of the oil industry, were thoroughly discussed by W. F. Rockwell, President, Rockwell Manufacturing Co., and A. E. McIntyre, General Manager, Pittsburgh Equitable Meter Div. and Nordstrom Valve Div. of the Rockwell organization.

In tracing the history of manufactured abrasives, F. J. Tone, Jr., Vice-President and General Sales Manager of The Carborundum Co., pointed out that as improvements in abrasives have permitted better finishes, so the introduction of new metalworking materials has spurred the industry to greater refinements in grinding processes.

Boyd H. Work, Manager, Abrasive Engineering and Product Development Div., and D. H. Currie, Abrasive Engineer, also of Carborundum, detailed various applications of crush dressing and diamond dressing of grinding wheels. E. V. Flanders, Chief Engineer, Thread Grinding Div., Jones & Lamson Machine Co., related his company's experience in crush and diamond dressing as applied to thread grinding.

Unusual applications of cemented carbides in drilling rock, sawing construction materials of rock composition and chemical-impregnated wood, cutting plastics and die casting powdered metal parts were revealed by Philip McKenna, President, and W. L. Kennicott, Chief Engineer of Kennametal, Inc., in their collaboration on the principles of design for carbides.

Utilization of the warm sea water from the Gulf of Mexico and Texas' vast supplies of natural gas were narrated by Dow Chemical Co. representatives in a session devoted to Magnesium and Plastics. Fabrication of both these materials calls for tool engineering ingenuity, the speakers made clear. Appearing on this program were N. D. Griswold, Assistant General Manager, Texas Div.; Gordon B. Thayer, Engineer in Charge of Molding Service, Plastics Div.; C. E. Lehnhardt, Chief Engineer, Magnesium Fabrication Div.; and Arthur M. Lennie, Sales Engineer, Magnesium Div.

James F. Lincoln, President, The Lincoln Electric Co., drew a capacity audience for his address stressing the urgency of proper incentives to increase production.

"Because management has no control over the worker," he stated, "the efficiency of production has gone down to a startling extent. Efficiency never will increase until the worker changes his present attitude of output limitation: therefore, he must look forward to a lower and lower standard of living under the present domination of union labor leadership."

Of the two alternatives, dictatorship and the pre-union competition for jobs, the Cleveland industrialist believes the solution is to make the worker change his attitude by making him part of the team of management and men. His own experience with incentives has demonstrated that wages can be quadrupled with a simultaneous product price reduction of more than 60%.

Warning that some form of totalitarianism is apparently inevitable, he declared, "It is obvious that if the average American recognized what the future must be with his present philosophy, he would resist it to the end. No American wants to lose his freedom. Therefore, the

Left: Quip by J. F. Lincoln (center), President, Lincoln Electric Co., gets laugh from President A. M. Sargent (left) and E. W. Baumgardner, chairman of session which Mr. Lincoln addressed. Below, left: Good losers, these New Orleans tool engineers grin after being trounced by team of Houston members in "Quiz of Two Cities" broadcast during convention. From left: Bill Brengel, Station WWL M.C.; J. O. Evans, Jack McGeown, M. J. Bayhi and A. R. Spillane. Bottom, left: Harold Ingham hits jackpot on Houston end of battle of wits, is rewarded by Ted Nabors, KTRH Program Director, while ASTE audience (right) beams admiration. In front are other members of team, from left: H. G. Boswell, D. C. Crowley and C. E. Ladner. Below, right: Detroit Chapter Past Chairmen get together at Houston. Standing, from left: C. L. House, G. H. Whitehouse, G. S. Wilcox, Jr., E. W. Kay, W. B. McClellan; seated: W. H. Smila and L. B. Bellamy (incumbent). J. A. Siegel and T. B. Carpenter, former chairmen and past presidents, also attended convention

Houston Chapter officers are installed by President Sargent during National Membership Meeting. At his right: Homer Briggs, Chairman; D. F. Saurenman, First Vice-Chairman; D. E. Mackenzie, Second Vice-Chairman; P. E. Brainard, Secretary; and Thomas J. Gilchrist, Treasurer

hopeful aspect of the situation is that, after we have had totalitarianism for one or more generations, there will undoubtedly be a revolution which will bring back the freedom which we are now sacrificing."

Late winter blizzards in the northern sections of the country prevented O. W. Winter, ASTE National Education Chairman, and W. D. Merrifield, Assistant to Director of Technical Education, Chrysler Corp., from reaching the convention for the educational session to be conducted by the former.

Mr. Merrifield's paper, "What Industry Expects of Education in the Development of Tool Engineers," was read by National Program Chairman H. D. Hall. In his paper, Mr. Merrifield contended that the training of tool engineers through a process of apprenticeship and job progression is long, expensive and wasteful.

In contrast, the cost to industry of cooperative college training could be amortized sooner in greater production efficiency, lower prices and increased markets.

He described details of the Chrysler program of shop work alternating between and corresponding with periods of college study in engineering theory.

In conclusion, he offered his company's cooperative work facilities to any university or college of recognized standing, installing the Society's proposed tool engineering course.

W. R. Woolrich, Dean of Engineering, University of Texas, in a discussion of what education can do in the development of tool engineers, listed three requirements for engineering students: design ability, creative thinking and machine sense. He advocated more careful classification of students before admission to the study of engineering, to reduce the high failure mortality of 77 per cent.

Guy Hubbard, Machine Tool Editor of *Steel,* reviewed the history of engineering, pointing out the difficulties encountered before it attained the status of a dignified profession.

* * *

One of the more important of the several radio programs broadcast in connection with the convention was the round table discussion, "What Is Wrong with American Industry Today?" by three industrial editors, Mr. Hubbard, H. E. Linsley, Machine Tool Editor, *The Iron Age;* and Howard Campbell, Editor of *Modern Machine Shop;* and a Houston member, C. A. Vogt of Howard, Johnson & Vogt.

Lack of productivity, boosting labor charges to 90 per cent of the product cost, was blamed as a hindrance to business recovery. Insufficient incentive for the worker was mentioned as the second sore spot in the industrial picture. Incentive systems were said to be so often complicated and difficult for employees to understand that many companies hesitate to install them.

Better tooling, enabling fewer and less skilled workers to produce more with less effort, was advanced as a means of coping with these problems.

The widespread employment resulting from the mechanization of the textile, automotive and printing industries was quoted to prove that the present fears of the building trades are groundless. Extensive prefabrication of houses would provide high employment in constructing parts and bring the mass-produced homes within the reach of more people.

On the lighter side, a team of four Houston members, C. E. Ladner, H. G. Boswell, D. C. Crowley and Harold Ingham, competed with J. O. Evans, Jack McGeown, M. J. Bayhi and A. R. Spillane of the New Orleans Chapter in a "Quiz of Two Cities" broadcast. The Houston tool engineers, supported by a large audience of convention guests, came through with more of the right answers, winning the contest with ten points to spare.

* * *

Favored with delightful mid-summer weather, some 120 ladies made the "Azalea Trail," visiting the spacious gardens on the estates of Miss Ima Hogg, Mrs. Michael Hogg and H. R. Cullen.

Displays of giant-flowered azaleas, brilliant camellias, stately Easter lilies, enormous pansies, and delicately-tinted hyacinths and other spring blooms in natural and formal settings brought exclamations of admiration and pleasure throughout the tour. Members of the River Oaks Garden Club accompanied the party and served as guides.

A style show luncheon, always popular with the fair sex, gave the engineers' wives another opportunity to get acquainted. Gift certificates were awarded by a Houston merchant as door prizes.

Officers and Directors of the Society had the technical speakers and a number of Houston executives as their guests at an Executives Luncheon held in the Houston Country Club. Dr. John J. Caton, Director of Education, Chrysler Corp., and one of the two Honorary Members of ASTE, told the group what ASTE means to industry, the importance of its activities, aims and purposes.

Right, upper: F. J. Tone (standing) gives first technical address at Annual Meeting. Others participating in opening session are, from left: B. H. Work, F. J. Schmitt, Chairman; D. H. Currie and E. V. Flanders; lower: W. H. Schott, 46 Pittsburgh Chairman, proudly claims Membership Trophy won by Chapter during his administration, as H. F. Volz, National Membership Chairman, offers congratulations. Below: National Officers solemnly repeat oath of office administered by A. M. Sargent, outgoing President. From his left: G. C. Johnson, 3rd Vice-President; R. B. Douglas, 2nd Vice-President; I. F. Holland, 1st Vice-President; W. B. Peirce, President; V. H. Ericson, Treasurer; and W. A. Dawson, Secretary. Bottom: A. A. Nichoson, Texas Co. executive, fascinates W. C. Lockwood (left) of Texas engineering staff, and F. E. Doty, Chairman, Houston Chapter convention committees, as he breezes along at 300 words a minute, telling tool engineers (right) story of oil

W. B. PEIRCE
President and Director

I. F. HOLLAND
1st Vice-Pres. and Dir.

R. B. DOUGLAS
2nd Vice-Pres. and Dir.

G. C. JOHNSON
3rd Vice-President

C. V. BRINER
Director

K. L. BUES
Director

W. A. DAWSON
Secretary

V. H. ERICSON
Treasurer

Peirce Wins Presidency

Los Angeles to Entertain Society in '48

LEADERSHIP OF the Society for 1947-48 was delegated to W. B. Peirce, Vice-President of Research and Development, Flannery Bolt Co., Bridgeville, Pa., when the Board of Directors elected National Officers during the Annual Meeting at Houston. Mr. Peirce served successively as National Membership Chairman, Third, Second and First Vice-President before his election to the presidency. He succeeds A. M. Sargent, President and General Manager, Pioneer Engineering and Mfg. Co., Detroit.

Other officers elected are: First Vice-President, I. F. Holland, General Superintendent, Small Tool and Gage Div., Pratt & Whitney, Div. Niles-Bement-Pond Co., W. Hartford, Conn.; Second Vice-President, R. B. Douglas, engineering consultant, Montreal, Que.; Third Vice-President, George C. Johnson, Chief Engineer, W. F. & John Barnes Co., Rockford, Ill.; and Secretary, W. A. Dawson, Branch Manager, F. F. Barber Machinery Co., Hamilton, Ont.

All were previous incumbents of National Offices, Mr. Holland having been Second Vice-President; Mr. Douglas, Third Vice-President; Mr. Johnson, National Secretary; and Mr. Dawson, Assistant Secretary-Treasurer. V. H. Ericson, Vice-President of Johnson de Vou, Inc., Boston, was re-elected Treasurer, and H. E. Conrad of the Central Office was re-elected Executive Secretary.

The Board voted to hold the 1948 Semi-Annual Meeting at Los Angeles and announced that the 1947 Semi-Annual at Boston would take place October 30-November 1, with the 1948 Annual Meeting and Exposition set for Cleveland the week of March 15.

Acting on the Constitution and By-Laws Committee report, given by Chairman R. H. Morris, the Board ruled that blue membership emblems should be issued to voting grades of membership, with non-voting members designated by the red insignia.

Volume I of "Elementary Jig and Fixture Design," the new teaching text co-sponsored by the Society and the N. Y. State Vocational and Practical Arts Association, was exhibited by the National Education Committee, headed by O. W. Winter. The three-book publication, previewed on Page 57 of the March *Tool Engineer*, is now available from the Central Office at $7.50 per set. Preparation of Vol. II will begin immediately.

The Manufacturing Analysis text, now in the preliminary stages at Rochester Institute of Technology, is being used in classes as the material is prepared.

More ASTE-approved curricula are being installed in technical institutes, the Committee reported, while tool engineering subjects are being included in mechanical and industrial engineering courses at college level.

Chapter representatives assemble in the House of Delegates to elect a Board of Directors. From left to right, 1st Row: G. A. Goodwin, Dayton, Richmond; G. F. Bryan, Pontiac; W. H. Schott, Pittsburgh, Erie; A. B. Bok, Toledo; E. W. Baumgardner and H. B. Osborn, Jr. (Alternate), Cleveland. Standing: Pres. A. M. Sargent who opened meeting. 2nd Row: E. J. Raves, Golden Gate; Anton Peck, Los Angeles; E. Y. Seborg, Rockford, Cedar Rapids; G. A. Exley, Baltimore, Central Penna.; J. A. McMonagle, Philadelphia; and W. J. Frederick, Cincinnati, Muncie. 3rd Row: (First man unidentified), M. W. Kotarba, Buffalo-Niagara Frontier; J. E. Paskey, Louisville; W. E. L. Bock, Columbus, Springfield, O.; W. W. Appleton, Toronto, Montreal; and C. A. Fisher (A), Hamilton, Niagara District. 4th Row: C. D. Toney, Jr. (A) and D. L. Hollowell, Atlanta; W. E. Baker, Twin Cities; C. R. Oliver, Nashville; C. J. Weingartner, Phoenix; and F. J. Siebenmann, Evansville. 5th Row: Homer Briggs, Houston; R. A. Smith, Hartford; James Allison, Akron; E. E. Graf (A), New Orleans; W. E. Farrell, Twin States; and G. E. Thomas, Indianapolis. 6th Row: H. H. Washbond, Springfield, Decatur, Ill.; R. T. Plitt, Potomac; J. F. McGowan (A), Little Rhody; J. J. Demuth, St. Louis; T. E. Newby, West. Mich.; and M. H. Kline, Fort Wayne. 7th Row: J. L. Webster, N. N. Jersey; A. D. Forbes, Boston; E. J. Stone, Springfield, Mass.; Eugene Roth (A), Gr. N. York, Williamsport, Mid-Hudson; W. E. Rutz, Fond du Lac. 8th Row: A. R. Gieringer, Milwaukee; H. J. Braun, Fox River Valley; A. T. Warman, Worcester; L. A. Kitchen, Flint; and C. C. Stevason, South Bend. Also in attendance were: T. H. C. Alison (A), Toronto, Montreal; F. B. Allen, Elmira; Fred Bates, Jr., North Texas; R. D. Caseo, Syracuse, Schenectody, Binghamton; C. J. Gluck, Fairfield County, New Haven; E. W. Kay (A), Detroit; Albert Kirchgessner (A), Buffalo-Niagara Frontier; W. B. McClellan, Detroit; W. B. Moore, Windsor; Harry Nelson (A), Chicago; H. A. Nelson (A), Rockford; R. W. Osburn, Wichita; M. L. Roessel (A), Rochester; E. H. Ruder (A), St. Louis; F. J. Schmitt, Chicago; J. P. Schommer (A), Fond du Lac; J. B. Schroer, Kansas City; and C. E. Seely, Rochester Chapter

C. B. COLE
Director

H. E. COLLINS
Director

T. J. DONOVAN, JR.
Director

A. M. SARGENT
Director

H. L. TIGGES
Director

G. S. WILCOX, JR.
Director

The National Membership Committee's drive for 10 per cent increase in membership by July is slightly ahead of schedule, according to the report of E. W. Dickett, Chairman. Membership, as of February 28, was 17,808, with four new Chapters chartered during the year at Evansville, Ind.; Poughkeepsie, N. Y.; Madison, Wis.; and Springfield, Ohio. A number of other cities show considerable Society activity.

A survey of Society membership indicates that 65½ per cent hold executive and specialized engineering positions, including 16½ per cent in administrative posts.

Data contained in manuscripts for the "Tool Engineers' Handbook" far exceeds expectations, E. W. Ernst, Handbook Committee Chairman, reported. The manual, scheduled to appear by the end of this year, contingent upon paper supply and the publisher's labor situation, will embrace information not found in any other one source.

The National Public Relations Committee plans to assist Chapters by issuing a memo on various phases of public relations and by visits and direct contacts with Chapter officers.

W. H. Smila, Chairman of the National Standards Committee, announced that the Committee's next issue of data sheets will be the largest ever distributed —more than one pound of material going to each member of the Society.

A collection of data sheets, sponsored by Canadian manufacturers is also being prepared for Dominion members.

Mr. Smila appointed A. M. Sargent Chairman of the ASA Committee B.52 for Classification of Materials for Tools, Fixtures and Gages, sponsored by ASTE.

* * *

The House of Delegates, composed of official representatives of the various Chapters and meeting concurrently with the Board of Directors, elected to the 1947-48 Board: C. V. Briner of Cleveland, K. L. Bues, San Francisco; C. B. Cole, Chicago; H. E. Collins, Houston; T. J. Donovan, Jr., Philadelphia; R. B. Douglas, I. F. Holland, W. B. Peirce, H. L. Tigges, Toledo; and G. S. Wilcox, Jr., Detroit. The retiring President, A. M. Sargent, is also a member of the new Board.

W. J. Frederick of Cincinnati served as Chairman and Anton Peck of Los Angeles as Recorder of the House of Delegates.

* * *

The newly-elected National Officers were installed by Mr. Sargent during the National Membership Meeting held during the final evening program of the convention. He also inducted the incoming Houston Chapter Officers, all of whom served on the convention committee: Homer Briggs, Chairman; D. F. Saurenman, First Vice-Chairman; D. E. Mackenzie, Second Vice-Chairman; P. E. Brainard, Secretary; and T. J. Gilchrist, Treasurer.

In his farewell address, Mr. Sargent warned: "If we are to compete with the other nations of the world who know nothing of the benefits which we have and perhaps fail to appreciate, then only by the production of more and better things through the ingenuity of the members of this Society will we be able to keep going."

Mr. Peirce, in his inaugural speech, urged closer cooperation with maximum economy, indicating that the Society should not take on many additional activities, but should streamline those already started.

National Committee Chairmen, appointed by President Peirce are: Constitution and By-Laws, J. J. Demuth of St. Louis; Editorial, W. B. McClellan, Detroit; Education, O. W. Winter, Buffalo; Finance, G. A. Goodwin, Dayton; Handbook, E. W. Ernst, Schenectady; Vice-Chairman, F. W. Curtis, Springfield, Mass.; Honor Awards, R. B. Douglas; Membership, H. F. Volz, Columbus; Program, R. W. Ford, Pittsburgh; Public Relations, Dr. H. B. Osborn, Jr., Cleveland; and Standards, W. H. Smila, Detroit.

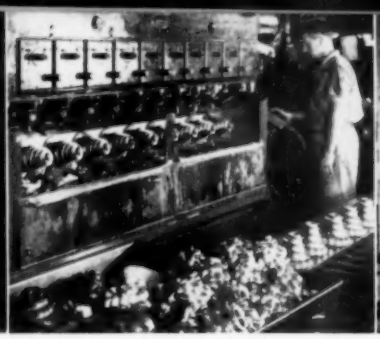
C. V. Briner was named Chairman of the 1948 Cleveland Exposition Committee, and R. H. Morris of Hartford will have charge of the project for acquiring new Society headquarters, with A. M. Sargent assigned to locating a building.

Other inaugural ceremonies included the transfer of the President's gavel, and membership in The Institution of Production Engineers, Great Britain; and the presentation of the retiring President's Life Membership Certificate.

H. F. Volz, National Membership Chairman, presented the ASTE Membership Trophy to W. H. Schott, who headed Pittsburgh Chapter during the past season when they won the coveted cup.

From top: 1. Two ASTE old timers, John J. Caton (left) and A. E. Rylander, talk things over. 2. R. H. Ford of National Program Committee, calls his session to order to present (from left) A. E. McIntyre and Col. W. F. Rockwell. (Banner belongs to Dallas and Fort Worth delegates.) 3. H. E. Linsley (right) questions his session speakers, Philip McKenna and W. L. Kennicott about an item from their exhibit. 4. A. M. Sargent (right) relinquishes Society gavel to his successor in the presidency, W. B. Peirce

Below, left: H. D. Hall, National Program Chairman, explains to technical session audience that O. W. Winter, National Education Chairman, scheduled to conduct meeting, has been grounded in a blizzard. Speakers, left to right, Guy Hubbard of *Steel* and Dr. W. R. Woolrich of University of Texas. Right: Certificates of Appreciation are presented by Chairman Homer Briggs to lecturers appearing on his program. At his left: F. Goldstone, Shell Oil Co.; J. H. Dunaway, Humble Oil & Refining Co.; and I. K. Fussell of the Schlumberger Well Surveying Corp.



"Operation Invisible"

Oil Well Drills Work Unseen

MOST MEMORABLE experience for those attending the Houston convention, was the drilling demonstration at the huge rig erected by the Superior Oil Co. of California in its field at Altair, 72 miles west of Houston.

When the ASTE party reached the scene, the boring was at a depth of 7100 feet after ten days of drilling, and proceeding slowly through hard rock formation. The equipment comprising the outdoor plant is the same as that being used in Oklahoma to drill the world's deepest well, projected to strike oil at 18,000 feet—nearly three and one-half miles below the surface.

Heat waves shimmered from the five big gas-fired boilers which supply power to the pumps and draw works used in drilling operations. Inside the derrick, the rotary table and Kelly revolved at varying speeds turning the drill bit eating its way through the earth. Beyond the platform, the mud coolant returning from the well was chemically treated and passed into settling troughs before being pumped back down. A blowout preventer installed beneath the floor controlled sub-surface pressures.

To renew the bit and check the drilling angle, the work was stopped and the drill pipe disconnected with a giant wrench operated by a winch. Suddenly a mud geyser spurted from the drilling pipe, forced up by the heavier cutting-laden mud between the pipe and the casing.

When the flow had subsided, an inclinator was dropped through the pipe to record the drilling angle, and the ten-ton elevator hook and block attached to the drill stem.

Perched in the steel framework, 120 feet above the floor, a workman nonchalantly secured the "fourbles," four-length sections of 30-foot pipe, as they were rapidly drawn from the bore—the beginning of a three-hour job before the worn bit would emerge from the ground!

* * *

Preparatory to the oil well visit, the Society toured several Houston plants manufacturing the equipment demonstrated. At Hughes Tool Co. and Reed Roller Bit Co., the tool engineers were impressed with the precision and ruggedness demanded in the production of the various types of drilling bits, threaded couplings welded to the ends of drill pipe under 77,000 pounds pressure, core bits to bring up samples of earth strata, drill collars to which the cones or rollers are attached, valve fittings and other parts.

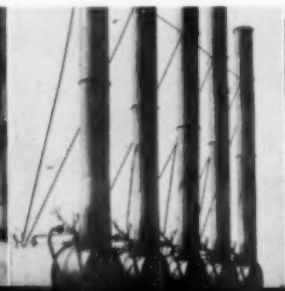
In plant research laboratories, tests are constantly being conducted on both used and newly-designed bits, to increase cutting speed and extend tool life.

At Emsco Derrick and Equipment Co., a great variety of machinery is brought into play in the making of large, heavy oil field equipment, many of the visiting group having an opportunity to see their own company's products in use. From galvanizing to gear shaving, the engineers were shown the operations entering into the production of mud pumps, draw works, derrick frames and related apparatus.

* * *

But with all the instruments, machines and tools for engineering petroleum production, the industry is still searching for a device to actually locate oil—science can only indicate structures which *may* contain it. The invention of a means to accurately determine oil sources would open up hidden stores of the vital fluid to supply the ever-increasing demands of the mechanical age, eliminate the waste in drilling unproductive sites, and reduce the price of the ultimate product.

Top, left: Off on a busman's holiday, these tool engineers will observe operations in a Houston plant; center: A multiple-spindle machine mills cross roller cutters for Reed rock bits; right: At Hughes Tool Co. a workman places rock bit head sections in heat treating furnace. Left, from top: 1. A guide at Emsco Derrick and Equipment Co. shows 74,000-lb. draw works capable of operating drilling equipment to depth of 20,000 feet. 2. Pump power frame boring is studied by another group. 3. These members keep a respectful distance from flame hardening machine. Margaret Amis (left center) of Fort Worth is only woman member attending convention. 4. Boring of speed reducer case gets close inspection at Emsco. Below, from left: 1. After drill pipe is disconnected, mud coolant spouts from oil well bore. 2. Large scale drilling impresses tool engineers watching "Kelly" in derrick. 3. Five gas-fired boilers are required to power big oil well installation at Altair, Texas. (Photos by Clare Bryan, Chicago.) 4. Drilling mud is treated with chemical solution as it returns from the well, runs into tanks to settle cuttings before being pumped down again. 5. Pumps, capable of developing 3000 lbs. pressure psi, force liquid mud through holes in bit and back to surface. (Photo by W. A. Dawson, Hamilton, Ont.)



Cowboys for a Day

At ASTE "Texas Day" Roundup

COMFORTABLY GARBED in picturesque regalia of hues and modes never before seen at an ASTE meeting, the entire Houston convention crowd celebrated the Host Chapter's "Texas Day" with a real Western rodeo and barbecue at Emil Marks' LH7 Ranch in Barker.

Tool engineers, in everything from dude ranch togs to ill-fitting denim dungarees, and the distaff side in gaudy shirts, decorated slacks and embroidered Mexican jackets vied for atmospheric effect with the costumed Mexican band, the cowpoke tootlers and ranch hands.

A big tent sheltered tables already set for the barbecue dinner being prepared in an adjacent cookhouse. Coffee and barbecue sauce bubbled in immense kettles over open fires. Borrowing assembly line techniques, the culinary crew served the hungry horde with dispatch, leaving plenty of time for "seconds" and for exploring the grounds before the big show opened.

From the grand entry to the Brahma bull bareback riding, the rodeo arena boiled with activity like a three-ring circus:

First the grand entry, a procession headed by Rancher Marks winding back and forth before the stands while contestants are introduced. Next a parade of valuable Brahma cows, steers and long horn cattle.

Then a branding contest with all the hazards of chance—tough luck here, the lasso slipped; a man down there with his horse rolling over; at the side of the field a calf trying desperately to jump the fence. But the fastest man wins with a time of 1 minute, 28 seconds to capture and brand the animal.

To the best team of steer ropers in the next event, James Daar of the Houston committee presents nylon lariats.

Now it's a calf tiedown—a cowboy swings his lariat, leaps off his horse, but the calf slips out of the noose, races down the field and through a gate. And the crowd cheers the lithe fugitive. But the next contestant fares better, downs the calf and secures a rope around three thrashing legs.

All eyes are on Homer Briggs, Houston Chapter Chairman, as he deposits a stack of cartons in the arena. Now he lines up the Society's "brass hats," presents them with handsome 10-gallon Stetsons.

Stealing the show every now and then, "Canadian Kid," the clown, and his clever mule, "Cockle Burr," amuse the spectators with their antics and endeavors to emulate the performers.

Beneath the judges' stand, a snorting bronc shakes the chute, plunges through the opening gate, pitches, rears, tosses his rider and continues to buck.

Best riding of the day is exhibited in the Ladies Flag Race, with entrants zooming up one side of the field, dropping a flag in a box en route, crossing the ring, snatching another flag, and pounding down to the finish line, the winner successfully negotiating the 1000-foot dash in 18.9 seconds!

Another commotion in the chutes. This time an obstreperous steer tries to climb out, is released, pursued by a mounted cowboy who pulls alongside, flings himself from his saddle, grasps the beast's horns, twists him down by brute strength.

Winners of the day's events are being called to the judges' stand to collect their prizes, the rodeo is over—and so is the convention, except for the memories of new experiences, good fellowship and hearty Texas hospitality.

Top, left: Grand entry of rodeo performers brings the spectators to their feet; center: One of the few remaining Texas herds of long horn cattle is paraded before stands; right: James Daar, Houston convention committeeman, congratulates cowboy on roping feat which won him nylon lariat. Right, from top: 1. In another moment steer will burst through gate, to be pursued by bulldogger who will try to twist him down. 2. This Canadian party enjoys "home on the range." From left: Mrs. Walter Appleton, Mrs. W. A. Dawson, Mrs. T. H. C. Alison, Mr. Alison, Mr. Dawson, (pony is Texan) Charles Fisher, H. H. Whitehall and Mr. Appleton (kneeling). 3. A cowgirl has her stirrup adjusted before the Ladies Flag Race. 4. Conchita and her escorts render Mexican airs. (Photos 1, 3, 4 by Clare Bryan, Chicago.) Bottom, left: Houston initiates these tenderfeet with regulation Stetsons. ASTE officers, from left, standing: H. E. Conrad, A. M. Sargent, W. B. Peirce, I. F. Holland, R. B. Douglas, G. C. Johnson, V. H. Ericson. Seated: H. D. Hall and W. A. Dawson. (Photo by Clare Bryan.) Right: Barbecue dinner tastes extra good "on location"

Osborn, Cleveland's 'Outstanding Young Man of 1946'
Society's Public Relations Chairman Wins Jaycee Award

Cleveland, Ohio — Dr. Harry B. Osborn, Jr., Sales Manager of the Ohio Crankshaft Co., has been acclaimed Greater Cleveland's "outstanding young man of 1946," receiving the annual Distinguished Service Award of the Cleveland Junior Chamber of Commerce, at their recent banquet.

H. B. Osborn, Jr.

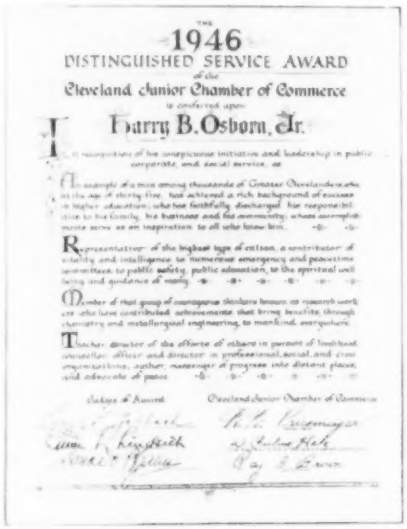
The award, presented "in recognition of his conspicuous initiative and leadership in public, corporate, and social service," cites his many accomplishments in these fields.

A resident of Cleveland since 1939 when he joined Ohio Crankshaft as Research and Development Engineer, Dr. Osborn formerly served on the faculty of Lehigh University and directed research in the graduate school. His Ph.D. and prior degrees were received from Lehigh. He is the author of many technical papers and publications on induction heating, lecturing before technical societies throughout the U. S. and Canada.

The newly-appointed Chairman of the ASTE National Public Relations Committee and First Vice-Chairman of Cleveland Chapter, he is affiliated with a number of other engineering societies and fraternities.

In addition to his business and professional activities, he participates in many civic, religious and educational projects. As Vice-President of the Cleveland Heights School Board, he has successfully championed the cause of higher salaries for teachers.

More than 600 Junior Chamber of Commerce members and their employers attended the dinner at the Mid-Day Club where Dr. Osborn was honored.



THE 1946
DISTINGUISHED SERVICE AWARD
of the
Cleveland Junior Chamber of Commerce
is conferred upon
Harry B. Osborn, Jr.
In recognition of his conspicuous initiative and leadership in public, corporate, and social service, as
An example of a man among thousands of Greater Clevelanders who in the age of thirty-five has achieved a rich background of success in higher education, who has faithfully discharged his responsibilities to his family, his business and his community, whose accomplishments serve as an inspiration to all who know him.
Representative of the highest type of citizen, a contributor of vitality and intelligence to numerous emergency and preventive committees to public safety, public education, to the spiritual well being and guidance of many.
Member of that group of courageous thinkers known as research workers who have contributed advancements that bring benefits, through chemistry and metallurgical engineering, to mankind everywhere.
Teacher, director of the efforts of others in pursuit of livelihood, counsellor, officer and director in professional, social and civic organizations, author, messenger of progress into distant places, and advocate of peace.
Judges of Award — Cleveland Junior Chamber of Commerce

Dr. Harry B. Osborn's award from the Cleveland "Jaycees" lauds him for educational, business, professional, civic and other accomplishments

Marasko, Vice-Chairman Of Standards Committee

Detroit, Mich.—W. H. Smila, Chairman of the ASTE National Standards Committee, has announced the appointment of E. J. Marasko, of Glenn Tool & Mfg. Co., Cleveland, as Vice-Chairman of the Committee. In accepting this office, Mr. Marasko automatically becomes Chairman of a Sub-Committee for the promulgation of Project No. 5—Standardization and the handling of ASA activities.

E. J. Marasko

A member of the National Standards Committee since 1945, Mr. Marasko has served as Chairman of the Cleveland Chapter Standards Committee for the past four years.

Tooling for Safety

Cincinnati, Ohio—Safety hazards often considered insignificant by the average engineer, but frequently a source of trouble, were stressed by R. E. Frederick, Sr., of International Business Machines Corp., Endicott, N. Y., in a lecture, "Tool Engineering for Safety," given before approximately 80 members and guests of Cincinnati Chapter at a recent dinner meeting in the Engineering Society Headquarters.

The speaker showed two films describing punch press safety measures possible with slide feeds, and general plant safety practices.

Three short sport films were shown before the technical session.

Predicts Industrial Uses Of Atomic Energy

Pittsburgh, Pa. — "Industrial Applications of Atomic Energy," as presented by Dr. J. A. Hutcheson, Associate Director of Westinghouse Research Laboratories, held the intense interest of the 120 members and guests attending a recent meeting of Pittsburgh Chapter.

Dr. Hutcheson's lecture was followed by an enthusiastic question and answer period devoted to this fascinating subject.

Officers elected for the current year are: P. H. Magnus, Chm.; W. S. Risser, 1st. V.-Chm.; F. T. Boyd, 2nd V.-Chm.; G. C. Wood, Treas.; and H. L. Harper, Secy. W. H. Schott, retiring Chairman, was elected Delegate, with H. G. Eisele as Alternate.

Kendig Manages Sales Div.

Philadelphia, Pa.—James E. Kendig, who has been associated with the engineering staff of Acme Aluminum Alloys, Inc., since 1931, has been appointed manager of Acme's new Eastern Sales Div.

J. E. Kendig

Territory serviced by the Philadelphia office extends from Maine to North Carolina and as far west as Pittsburgh.

Mr. Kendig will supervise sales and service on the company's aluminum alloy castings in both sand and permanent mold, tools and dies, pattern making and design or special engineering.

He is a member of Dayton Chapter, ASTE.

Sargent to Receive Honorary Degree

Detroit, Mich.—A. M. Sargent, immediate Past President of ASTE, will be granted an honorary Doctor of Engineering degree by Lawrence Institute of Technology during its commencement exercises, June 14, in the Rackham Educational Memorial, Detroit.

In announcing this honor, E. George Lawrence, President of Lawrence Tech, said: "Lawrence Institute of Technology is pleased to honor Mr. Sargent in recognition of his outstanding leadership and contributions in the field of engineering. We feel that he is symbolic of the dynamic young management which is solving today's industrial problems in America.

"Mr. Sargent's rise to prominence as Chairman of the Board, President and General Manager of the Pioneer Mfg. Co. and two other concerns is a story of inspiration for American youth. His election in 1946 to the presidency of one of the world's largest technical societies, the American Society of Tool Engineers, further demonstrates his power of leadership and his interest in the profession.

"In a relatively short span of years he has risen to national prominence in the engineering field. He has earned the greatest honor in the power of Lawrence Institute of Technology to bestow."

Other News In This Issue

Chapter	Page
Baltimore	60
Boston	62, 64
Buffalo-Niagara Frontier	58
Chicago	57, 62
Cincinnati	63
Decatur	60
Detroit	59
Elmira	61, 63
Erie	61, 63
Evansville	58, 60
Flint	59
(Grand Rapids) Western Michigan	59
Hamilton	60
Hartford	60
Houston	57
Indianapolis	57, 61
Los Angeles	61
Milwaukee	61
(Minneapolis) Twin City	57
New Haven	58
New York, Greater	58
Philadelphia	62
Pittsburgh	63
Pontiac	57
Portland (Ore.)	60, 63
(Poughkeepsie) Mid-Hudson	62
(Providence) Little Rhody	59, 61
Racine	62
Richmond	58
Rochester	58
Rockford	62
San Diego	64
(San Francisco) Golden Gate	59
(Springfield, Vt.) Twin States	58
(St. Charles, Ill.) Fox River Valley	57
St. Louis	58, 60
Toledo	63
Toronto	63, 64
Worcester	59
Coming Meetings	64
Obituaries	64
Situations Wanted	59

Rhodes Becomes Chair'n

Pontiac, Mich.—At the March meeting of Pontiac Chapter, A. J. Rhodes, former Secretary, was installed as Chairman. Other officers inducted are: 1st V.-Chm., L. B. Arscott; 2nd V.-Chm., Clare Utley; Secy., C. M. Walter; Treas., M. J. Scott; Delegate, G. F. Bryan; and Alternate, N. E. Maytag.

A. J. Rhodes

A film, "Conveyors in Industry," was shown through the courtesy of J. V. Webb Co.

* * *

C. S. McCarthy, Chief Engineer of American Forging & Socket Co., was a guest speaker at the previous meeting of the Chapter. He discussed the problems of upsetting tubing.

R. J. Emmert, Factory Manager of G.M.C. Truck and Coach Co., also addressed the meeting. Mr. Emmert reviewed Senator Vandenberg's recent speech on the superiority of American production.

First Automatic Turned Wood Screw in 6 Seconds

St. Charles, Ill.—Ten wood screws per minute was the production of the first automatic screw machine invented in 1817, according to Creighton Audette, Sales Manager of Cone Automatic Machine Co., Windsor, Vt., in a lecture on the Six-Spindle Conomatic.

Speaking recently before 78 members and guests of Fox River Valley Chapter, Mr. Audette outlined the history and development of automatics, their construction and performance, and advancements in design.

During his talk, samples of work done on Cone automatics were passed around for inspection. A sound-color film was also shown, demonstrating the complex mechanisms required to effect coordination in machining unusual products.

Chapter officers elected by the membership are: Chm., R. G. Frogness; 1st V.-Chm., R. F. Waindle; 2nd V.-Chm., B. J. Phillips; Secy., R. T. Berg; Treas., C. H. Alltop; Delegate, H. J. Braun; and Alternate, G. M. Waller.

Broaching Films Shown

Minneapolis, Minn. — Eight members and guests of Twin City Chapter recently attended a meeting in Dunwoody Institute to see two color-sound films, "Making a Broach" and "Surface Broaching," presented by Kenneth N. Macomber, Chief Engineer of the Lapointe Machine Tool Co., Hudson, Mass.

K. N. Macomber

The two films clearly depicted the manufacture of broaches and broaching operations. Mr. Macomber, who has had a wide range of experience in the broaching industry, answered questions concerning individual problems at the close of the program.

The Chapter elected a Nominating Committee of three, including Wallace Ahlberg, Chairman; Herman Seaberg and Glen Roberts.

Society to Present Medal for Arc-Welding Paper
Nominations for Lincoln Award Close September 30

Detroit, Mich.—For the best manuscript relating to advancement of the theory and practice of arc-welding in the field of tool engineering, published in one of its official publications or read before a local or national Society meeting, ASTE will offer its membership a gold medal sponsored by the James F. Lincoln Arc-Welding Foundation.

The award, established to encourage scientific interest in further development of the arc-welding process, is to be made annually for ten years. The two and one-half inch medal, bearing the recipient's name, will be accompanied by an engraved certificate and will remain in the permanent possession of the awardee.

Obverse and reverse sides of the Lincoln Foundation Gold Medal to be awarded annually to a member of ASTE. Actual size of medal is 2½ in.

Judgment will be based primarily upon the value of the paper as an original contribution, not as an exposition of some development already known. All such papers publicly presented before the Society automatically become eligible for consideration by the Award Committee.

Among other conditions, governing the award of the James F. Lincoln Medal, candidates must be members of the American Society of Tool Engineers. Nominations for candidates to be considered may be submitted by any ASTE Chapter or member to: Executive Secretary, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich., on or before September 30 of each year.

At least three copies of the paper to be considered should be forwarded with the nomination, if the paper has been presented at other than a National Meeting of the Society or in one of its official publications.

The Honor Awards Committee, responsible for administration of the award, will recommend appointment of a committee of judges known as the Lincoln Award Sub-Committee. The Award Committee will make their recommendations for the recipient of this medal before December 1 of each year.

Presentation of the award will be made by the President of the Society at the ASTE Annual Dinner.

The Lincoln Medal is the first award to be developed through the efforts of the Society's Honor Awards Committee. During its year of existence, the Committee, chairmanned by R. B. Douglas, has laid the groundwork for a schedule of honors recognizing technical advances.

Spurs Membership Drive With Campaign Dinner

Indianapolis, Ind.—In conjunction with the local ASTE membership drive, the officers and committeemen of Indianapolis Chapter recently conducted a special dinner meeting, restricted to members and sponsored by the Chapter.

Chairman D. R. Smith opened the meeting by introducing L. P. Russell, manager of a local hardware company, who had donated the use of the hall. Mr. Russell welcomed the Chapter and extended an invitation to return.

The membership campaign meeting was informal, and the officers and committeemen impressed upon the group their responsibilities in maintaining membership. Both officers and members contributed many ideas and suggestions.

After adjournment of the meeting, a social hour afforded an opportunity for members to become better acquainted.

Schmitt Elected Chairman

Chicago, Ill.—F. J. Schmitt, Director of Sales, D. A. Stuart Oil Co., was elected Chairman of Chicago Chapter at the Annual Meeting in the Furniture Mart.

Other officers elected are: First Vice-Chairman, Harold M. Taylor, Vice-President, Supplies, Inc.; Second Vice-Chairman, Anton Schwister, District Manager, Greenfield Tap and Die Corp.; Secretary, Ray Erickson, Tool Engineer, Signode Steel Strapping Co.; and Treasurer, Frank M. Kincaid, Partner, Marflo Co.

Following the election of officers, Clare Bryan, Consulting Tool Engineer for Link-Belt Co. and retiring Chapter Chairman, gave his lecture, "Practical Engineering of Jigs and Fixtures," before an audience of about 175 members and guests.

Mr. Bryan laid particular stress on clamping of work, methods of clamping and reasons, and also gave pointers on simple temporary tooling, including tool holders, boring tools and bars and universal methods of tooling.

Vogt Partner in New Firm

Houston, Tex.—Chris A. Vogt, has entered the partnership of Howard, Johnson & Vogt, a consulting service in industrial, electrical, mechanical and tool engineering.

C. A. Vogt

For six months previous to the new association, Mr. Vogt served as consulting engineer with J. H. Howard & Co., the predecessor firm. Earlier he was connected with Cameron Iron Works and Reed Roller Bit Co.

He is a Past Chairman of Houston Chapter, a member of the National Education Committee, and headed the Notices and Announcements Committee for the recent Houston convention.

Top: Milton Roessel (with gavel) takes over chairmanship of Rochester Chapter at March installation night. Around him are, from left: Emmet Moore, 3rd V.-Chm.; Martin Ness, Secy.; Herbert Simon, 1st V.-Chm.; Charles Seely, Past Chm.; Fred Bittner, Treas.; and William Gordon, 2nd V.-Chm. Center: Earle W. DeBisschop (left), Past Chm., and Sherman Hagberg (right) of the Natl. Education Committee, linger after a technical session for informal discussion with the speaker, C. R. Maxon. Bottom: "Ernie" Straw presides at the microphone during Third Annual Ladies Night Dinner Dance in Powers Hotel

Tells Fundamentals, Uses Of Fluid Power in Action

Springfield, Vt.—H. L. Stewart, Advertising Manager for the Logansport Machine Co., illustrated his topic, "Fluid Power in Action," with slides during his recent address before a Twin States Chapter meeting in the Adnabrown Hotel.

Mr. Stewart discussed three common applications of this power in action: Air cylinders, airdraulic cylinders and hydraulic cylinders, and showed applications of these power units to several different types of machinery.

During the business section of the meeting, the following Nominating Committee was elected: George Morin, Ernest Flanders and Charles Green.

Walker Now Foreman

Evansville, Ind.—Clarence A. Walker has been named Foreman of the Foiling and Packing Dept. at Hoosier-Cardinal Corp.

Mr. Walker has been associated with Hoosier-Cardinal since joining the Assembly Dept. in 1939. Subsequently transferred to other departments, he was recently active in tooling the Plastic Finishing Dept. until his present assignment. He is a charter member of Evansville Chapter, ASTE.

New Officers Sworn In

Rochester, N. Y.—Officers for 1947-48 were installed at Rochester Chapter's March meeting in Rochester Institute of Technology. Taking the oath of office were: Chm., M. L. Roessel; 1st V.-Chm., H. O. Simon; 2nd V.-Chm., W. R. Gordon; 3rd V.-Chm., E. W. Moore; Secy., M. R. Ness; Treas., F. E. Bittner; Delegate, C. E. Seely; and Alternate, Mr. Roessel. Also chosen for three-year terms on the Chapter Executive Board were R. G. Howard, S. B. Hagberg and W. B. Kamola.

Chairman Roessel announced the following committee chairmen to serve during his administration: Budget, E. T. Gruendike; Program, R. T. Barnett; Advertising, R. E. Hall; Education, S. B. Hagberg; Editorial, W. B. Kamola; Public Relations, C. L. DeMartin; Membership, G. E. Codd; Standards, R. G. Howard; Constitution and By-Laws, J. O. Horne; Entertainment, E. G. Straw; and Historian, D. F. Kohler.

Kodachrome sound films, depicting basic hydraulics, fluid motion in hydraulics, modern plastics and heat treating hints, were shown.

* * *

The recent Third Annual Ladies Night, held in the Powers Hotel, was attended by 212. A social hour and dinner preceded an evening of dancing. A magician also entertained.

* * *

C. R. Maxon of the New Jersey Zinc Co. was the technical speaker at the previous meeting. His discussion of Die Castings was accompanied by a color film showing methods and materials used.

Dinner and election of officers preceded Mr. Maxon's address and the subsequent question period.

Winter Heads Acme

Buffalo, N. Y.—Otto W. Winter has been elected President and General Manager of Acme Pattern & Machine Co., according to a recent announcement. Before his advancement, Mr. Winter held the office of Vice-President.

O. W. Winter

Mr. Winter is also president of the Idea Development Corp., an engineering and designing firm supplementing Acme's engineering staff.

A former ASTE President and long-time Chairman of the Society's National Education Committee, he has had a broad and varied experience in the machine and tool industry.

Coopland Stresses Pride In Home Community

Richmond, Ind. — Harry Coopland, world traveler and humorist of St. Louis, entertained Richmond Chapter members recently with a short talk in which he stressed community selling and pride. He drew from a seemingly inexhaustible fund of anecdotes to give the members an enjoyable evening.

Officers for the new Chapter year were elected as follows: Chm., L. B. Penland; 1st V.-Chm., J. E. Church; 2nd V.-Chm., F. T. Sykes; Secy., H. E. McCain; Treas., G. E. Hall; and Delegate, J. W. Johnson.

A $100 pre-engineering scholarship to be awarded by the Chapter was oversubscribed by the membership.

Executives Told Tooling Can Ease Labor Shortage

New Haven, Conn.—The current lack of skilled labor must be overcome by the tool engineer through the design of proper tooling so that less proficient workers can be utilized.

A. S. Redway

This, and other problems challenging the ingenuity of the tool engineer, was stressed by A. S. Redway, Vice-Pres. and Gen. Mgr., The Geometric Tool Co., while addressing 87 members and guests at New Haven Chapter's Executives Night, March 13.

In discussing the "Relationship Between Management and the Tool Engineer," he also emphasized the value of "know-how" when opportunities for promotions occur.

Fred Dawless, a former Director, administered the oath of office to: R. E. Gifford, Chm.; A. V. Pollard, 1st V.-Chm.; F. W. Braynard, 2nd V.-Chm.; G. P. Schoeller, Secy.; T. D. O'Connor, Treas.; F. A. Shute, Delegate; and R. E. Gifford, Alternate.

Distinguished guests included Wayne Vosper, V-Mac Industries; Harry Westcott, Westcott and Napes; Carl Schott, G. & O. Mfg. Co.; and G. P. Stevens, Jr., Hoggson & Pettis Mfg. Co.

* * *

Z. C. Van Schwartz, Chief of Machine Division and Research, Peck, Stow and Wilcox Co., Southington, was guest speaker at the preceding meeting.

Mr. Schwartz read a paper concerning "High Speed and High Cycle Milling," of aluminum alloys and tough alloy steels. Lantern slides were used for illustration.

Election of officers took place prior to the technical session.

"Prof." Oakes Entertains Election Night Audience

St. Louis, Mo.—Officers for the ensuing year were elected at a recent meeting attended by 217 St. Louis Chapter members.

Those chosen to conduct the Chapter for 1947-48 are: Chm., E. H. Ruder; 1st V.-Chm., H. M. Creasey; 2nd V.-Chm., W. G. Callies; Secy., E. P. Huchzermeier; Treas., R. G. Kallemier; Delegate, J. J. Demuth; and Alternate, O. W. Johaning.

After the business meeting, "Prof." Russell E. Oakes, the "Wizard of Waukesha," entertained with his "goofy gadgets."

Officers Pledged to Build Membership, Fraternity

New York City — At the annual election, Greater New York Chapter approved a slate of officers pledged to increase membership and promote greater fraternity.

Heading the list as Chairman is H. S. Hunt. Others elected are: E. J. Novack, 1st V.-Chm.; W. H. Lentz, 2nd V.-Chm.; Julius Schoen, Treas.; V. H. Laughner, Secy.; H. L. Horton, Delegate; and W. C. Rhodes, Alternate.

Plans to increase membership include mailings of the Chapter bulletin to nonmember key executives and tool engineers, to be followed by personal calls.

Hubbard Tells Executives Of T.E.'s Influence

Detroit, Mich. — Industrial Executive Night was observed at the March 13 dinner meeting of Detroit Chapter, each member having been asked to bring his employer or a man of equal prominence so that more executives might become familiar with the work of the Society.

Guy Hubbard, Machine Tool Editor of *Steel*, was the guest speaker, presenting in an interesting manner the history of machine tools and how the insistence of tool engineers brought a great many changes in design and the perfecting of today's machine tools.

Following the dinner, J. A. Siegel, the Society's first President, administered the oath of office to: L. B. Bellamy, Chm.; Andrew Carnegie, 1st V.-Chm.; William Moreland, 2nd V.-Chm.; M. O. Cox, Secy.; R. D. Seeley, Treas; W. B. McClellan, Delegate; and E. W. Kay, Alternate.

Speakers' table guests included A. M. Sargent, retiring President; W. B. Peirce, President; and H. E. Conrad, Executive Secretary.

Lectures on Hydraulics

Providence, R. I.—Approximately 100 members and guests of Little Rhody Chapter enjoyed an illustrated lecture by L. R. Twyman, Mgr., Ind. Div., Vickers, Inc., Detroit, Mich., at a recent meeting in Oates Tavern. Mr. Twyman's subject, "Hydraulics," and his method of presentation captured the interest of his audience. His lecture was followed by a 35mm. screen presentation of a naval training program featuring the 40mm. gun.

L. R. Twyman

K. Austin of R. I. State College explained college activities in developing courses along tool engineering lines.

Bronze in Engineering Used Through the Ages

Grand Rapids, Mich.—S. C. Lawson, Asst. General Sales Mgr. of Ampco Metal, Inc., Milwaukee, Wis., was a recent speaker at Western Michigan Chapter.

His talk, "Bronze as an Engineering Material," included the history of bronze as well as the characteristics and applications of bronze alloys.

"Golden Horizons," a color-sound film, produced by Ampco and starring members of the Ampco staff, narrated the uses of bronze through the ages.

As the concluding feature, R. E. Reynolds, of Elmes Engineering Works, described and demonstrated new development in hydraulic presses.

Monigle Elected Chairman

Worcester, Mass.—C. W. Monigle was elected Chairman of Worcester Chapter at its recent Annual Meeting in Putnam & Thurston's Restaurant. Other officers chosen are: 1st V.-Chm., R. E. Rawlings; 2nd V.-Chm., C. D. Schofield; Secy., C. L. Morse; and Treas., H. F. Thompson.

E. T. Larson, Sales Engineer for Norton Co., spoke on "Recent Developments in the Grinding of Carbide Tools and Cutters." His address was illustrated with a new Norton film of the same title.

Living Standards to Rise Through Wartime Progress

Flint, Mich. — Approximately 100 members and guests of Flint Chapter assembled recently at Zehnder's Hotel in Frankenmuth to hear A. A. Schwartz, Buffalo production consultant, discuss "The Tool Engineer's Job That Only He Can Do."

Pointing out the significance of tool engineering in the progress of our standard of living, Mr. Schwartz described some of the wartime developments which will help put more goods within the reach of larger numbers of consumers.

Some of the advancements mentioned are: steel with high heat resistance, used in internal combustion turbines at 1500° F.; new and better carbide cutting tools, magnesium, new aluminum alloys, synthetic gems, plastics, new welding materials, and the many new small tools and machine tools.

The speaker also described some of his patented machines invented while he was associated with Bell Aircraft.

Prior to Mr. Schwartz' talk, the membership elected as officers for 1947-48: Chm., N. F. Snyder; 1st V.-Chm., H. T. Pierpont; 2nd V.-Chm., J. A. Koeppen; Secy., H. A. DeVore; Treas., R. M. Ayers; Delegate, L. A. Kitchen; and Alternate, Michael Skunda.

After the technical session, a film on shankless drills was shown. Harry Delaney, Chief Engineer of Republic Drill Co., answered questions concerning the manufacture of these drills.

Situations Wanted

ENGINEER — Age 42, with 20 years' mechanical, metallurgical, tool and production engineering, desires responsible supervisory or administrative position. Thoroughly experienced in forging, stamping, drawing, fabrication and heat treatment of metals or manufacture of metal products; design of tools and equipment, machine shop and tool room supervision, also installation of job evaluation, merit rating, methods improvement, operation sheets, manufacturing procedures, layout of production operations and equipment. Now available and free to go anywhere. Address replies to Box 112, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

INDUSTRIAL ENGINEER — Age 45, extensively experienced in methods, plant layout, materials handling, time study and wage incentives for machine and assembly operations on a mass production basis. Supervisory experience includes 2 years as Chief Methods Engineer of plant employing 4000. Complete resume on request. Write Box 114, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

TOOL AND MACHINE DESIGNER — Age 29, 8½ years' experience tool, die, gage, fixture and machine design. Can qualify as checker, material expediter or service engineer. Seeks permanent connection with small Eastern firm located in Vermont, New Hampshire or Northeastern New York. References and qualifications in first letter. Senior member ASTE. Send inquiries to Box 115, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

Snodgrass Named Chm'n

San Francisco, Calif. — Election of officers marked the recent Annual Meeting of Golden Gate Chapter at the El Curtola Cafe, Oakland.

The membership chose the following as 1947-48 executives: Chm., F. V. Snodgrass; 1st V.-Chm., E. C. Holden; 2nd V.-Chm., Florindo Viti; Secy., I. S. Minetti; Treas., H. B. Keys; Delegate, E. J. Raves; and Alternate, H. H. Hagedorn.

Reports of committee chairmen brought into focus the progress of the Chapter during the past year.

At the conclusion of the business meeting, two films were shown. One, a Packard Motor release, "Men Bet Their Lives on It," depicted the role of the Packard engine during World War II; the other showed highlights of the 1946 World Series.

Golden Gate Chapter affairs this year will be under the direction of, from left: I. S. Minetti, Secy.; Florindo Viti, 2nd V.-Chm.; E. C. Holden, 1st V.-Chm.; and F. V. Snodgrass, Chm.

Top: W. B. McClellan, retiring Chairman of Detroit Chapter, receives his Past Chairman pin from M. O. Cox, incoming Secretary, during Industrial Executive Night program. Left to right: H. E. Conrad, Executive Secretary; A. M. Sargent, retiring President; Mr. McClellan and Mr. Cox, and Guy Hubbard, Machine Tool Editor of *Steel* who gave principal address of the evening. Below: Speakers' table at Worcester Chapter Annual Meeting. E. T. Larson of Norton Co. (fourth from left) presented technical feature

Arthur A. Schwartz, Buffalo production consultant, answers questions at the "bull session" following his talk on engineering progress before Flint Chapter. At his left is Norman F. Snyder, unanimously elected Chapter Chairman

Left: A universal die sinker with a trick rotary head motion came in for some interested inspection by Hartford members during their recent visit to the Pratt & Whitney plant. Center: These tool engineers are impressed with the way high speed steel and tungsten carbide burrs, driven by a Kellerflex machine, can get them out of a difficult spot. Right: Another ASTE group pauses to marvel at the phenomenal accuracy of a jig borer

Pratt & Whitney Host For Tool and Gage Tour

Hartford, Conn.—More than 165 Hartford members participated in the afternoon visit to the Pratt & Whitney plant, which preceded a recent Chapter meeting.

In small groups the party was taken through the Machine Tool Division, with experts from the division as guides. Ample time was given to study everything in production and to ask questions of both guides and workmen. Similar tours were conducted through the Small Tool and Gage Departments.

The engineers were invited to return individually or in very small groups to inspect the Constant Temperature Room which could not be opened to large numbers of visitors.

After dinner in the plant cafeteria and greetings from R. F. V. Stanton, a member representing the P & W management, the group elected the following Chapter officers: Chm., R. A. Smith; 1st V.-Chm., W. F. Jarvis; 2nd V.-Chm., O. S. Parsons; Treas., J. T. Fitzgerald; Secy., D. B. Huntting; Delegate, R. A. Smith; Alternate, W. F. Jarvis.

* * *

The newly-elected officers were installed during the following month's meeting in the Hartford Gas Co. Auditorium. Chairman R. A. Smith announced as committee appointments: Membership, H. E. Kuryla; Program, W. F. Jarvis; Public Relations and Industrial Relations, K. F. Thomas; Editorial, A. J. Gustafson; Constitution and By-Laws, H. T. Hauck; Standards and Data, J. J. Balciunas; Entertainment, O. A. Gingras; and Education, L. B. Ewen.

Technical speaker was A. O. Schmidt, Research Engineer of Kearney & Trecker Corp., Milwaukee, Wis. In his address, "Engineering and Tooling for Better Milling," Mr. Schmidt gave a fund of information on the design and functions of the milling machine, emphasizing the importance of the cutting edge of the tool.

With slides he showed the design of cutters, comparing tool life in both positive and negative rake angles, and s.f.m. of cutting edge wear. A lengthy question period followed.

To Design New Products

Evansville, Ind.—Peter Rettig, Foreman of Metal Craft, Inc., has accepted the additional assignment of Product Designer. Mr. Rettig will be engaged in the design of products manufactured as an auxiliary line to maintain year-round employment for Metal Craft personnel. He is affiliated with Evansville Chapter.

New Officers Installed

Decatur, Ill.—New officers of Decatur Chapter were installed by Retiring Chairman C. E. White during the March meeting in the Decatur Club. Those taking office were: Chm., R. W. Howell; 1st V.-Chm., Fred Sabottka; 2nd V.-Chm., H. C. Vogt; Secy., J. W. Miller; and Treas., F. E. Hardy.

After receiving the charter and Chapter Chairman pin, Mr. Howell congratulated Mr. White on his successful efforts in bringing the Chapter through a crucial year.

M. L. Hinkle, District Manager, Molded Products Div., Goodrich Rubber Co., Akron, Ohio, presented the technical subject, "Manufacture of Molded Rubber Products and Uses," describing compression and extrusion methods of molding and the trimming of the finished product. A Goodrich color-sound film narrated the story of rubber and its myriad uses.

* * *

J. F. Ireland, Sales Manager, Sapphire Products Div., Elgin National Watch Co., Aurora, gave a film-illustrated address, "Sapphire, an Engineering Material," at the previous meeting of the Chapter.

Election of officers was held before the technical session.

Explains, Demonstrates Electronic Drive

Baltimore, Md.—J. W. Harper, Application Engineer, Machine Tool Div., General Electric Co., addressed a dinner meeting of Baltimore Chapter, held recently, in the Engineers Club.

Mr. Harper's subject, "Electric Drive as Applied to Machine Tools," was illustrated with a series of slides.

At the conclusion of his discussion, the speaker gave a demonstration of the electronic thymotrol drive.

J. W. Harper

Promoted to Sales Dept.

Evansville, Ind.—William Bach, formerly Superintendent of the Plastic Div., Hoosier-Cardinal Corp., is now a member of the Sales Engineering Dept., it has been announced.

A Purdue ME graduate, he was first employed by General Electric Co., joining Hoosier Lamp & Stamping Corp. in 1940. After five years of active duty in the Field Artillery as a service school instructor, he was discharged last year with the rank of lieutenant colonel, returning to his prewar post at Hoosier.

Exposes Current Rackets

Portland, Ore.—Lyle Janze, General Manager, Portland Better Business Bureau, was a recent speaker before Portland Chapter.

In a revealing talk, "Current Rackets," Mr. Janze told how his office has been actively engaged in fighting rackets and get-rich-quick schemes for a quarter of a century, relating methods employed to prevent loss and prosecute criminals.

A. M. Sargent, retiring ASTE President, also a speaker, discussed the aims and progress of the Society and its plans for the future.

During the evening Eugene Butzer, Raymond E. Neils and Clement J. Sharkey were elected to serve as a Nominating Committee.

Guests introduced were: A. P. Lerch, Chief Tool Engineer, the Hyster Co.; Robert Weber of the Iron Fireman Mfg. Co.; and Mr. James of the North Coast Engineering Co., formerly of Detroit.

New Lathe Turns Contours And Irregular Shapes

St. Louis, Mo.—One hundred and eighty members and guests of St. Louis Chapter heard S. E. Beer, Special Sales Representative of the Monarch Machine Tool Co., discuss "The Latest Developments in the Turning Field," at a recent Chapter meeting.

Of great interest were the new lathes for contour and irregular shape turning described by the speaker and shown in the accompanying slides and film. The motion pictures demonstrated the apparently impossible task of turning a square piece and many other difficult patterns on a lathe with special cam setup to regulate the cross slide.

Election of a Nominating Committee preceded the technical session. Those chosen are: Ralph Mueller, Chairman; E. H. Doogan and W. G. Ehrhardt, all Past Chairmen of the Chapter.

Metallurgist Evaluates Tool Steels, Applications

Hamilton, Ont.—Harold B. Chambers, Metallurgical Engineer for Atlas Steels, Ltd., was a recent speaker before Hamilton Chapter, lecturing on the subject of "Tool Steels for Blanking and Forming."

Mr. Chambers' address, dealing with type of tool applications, chemical bases, application and evaluation of plain carbon steel, was augmented with slides.

The following Chapter officers were elected during the meeting: Chm., W. A. Alexander; 1st V.-Chm., Gordon Hall; 2nd V.-Chm., H. H. Coit; Secy., George Gilmour; and Treas., R. T. Vincent.

Horton Heads Hoosiers

Indianapolis, Ind.—March meeting of Indianapolis Chapter featured the installation of new officers. Those inducted are: Chm., J. E. Horton; 1st V.-Chm., C. M. Wetzel; 2nd V.-Chm., H. W. Curfman; Secy., R. F. Krause; and Treas., E. W. Hilkenbach.

Clare Bryan, Consulting Tool Engineer of Link-Belt Co., Chicago, offered some new approaches to tooling problems, especially as concerns large parts, in his technical address, "Practical Engineering of Jigs and Fixtures."

With slides, Mr. Bryan showed that on very large castings tolerances could be held to .0002 on hole location and .0001 on hole size.

W. B. McClellan, National Editorial Chairman and an incognito visitor, was recognized and spoke briefly concerning *The Tool Engineer*.

* * *

F. R. Bokorney of the Balancing Machine Div., Gisholt Machine Co., Madison, Wis., discussed "Balancing Machines and Associated Correction Equipment" at the previous Chapter meeting.

Wider use of balancing equipment has developed with increased speeds in machine parts, Mr. Bokorney stated. Examples cited included two small turbines, running at 100,000 rpm and used in the production of the atomic bomb and proximity fuse.

Measurement of unbalance in units of ounce inches was described, as well as the two basic types of unbalance—static and dynamic. Slides and motion pictures were shown to demonstrate advanced balancing machines and applications.

Joins Detroit Die Set

Milwaukee, Wis.—Walter C. Weigle now represents Detroit Die Set Corp. throughout Wisconsin. For the past eight years, Mr. Weigle has been with Superior Steel Products Corp. as Sales Manager and Purchasing Agent.

W. C. Weigle

Earlier connections include service with Allis-Chalmers Mfg. Co., Symington-Anderson Ordnance of Rochester, N. Y., and the Hog Island Ship Yards in Philadelphia.

He is affiliated with Milwaukee Chapter, ASTE.

Gives Pantographing Talk

Milwaukee, Wis. — Harvey Klema, Assistant Sales and Service Manager of the George Gorton Machine Co., Racine, was the technical speaker at the recent Annual Meeting of Milwaukee Chapter.

Mr. Klema gave a short history of duplicating and pantographing before showing "An Exact Duplicate," a color-sound film describing the application of duplicating machines, pantograph engraving, production profiling, multiple etching, contour grinding, diemaking and tracer control duplicating.

After the motion picture, Mr. Klema answered questions from the floor.

Election of Chapter officers conducted before the technical session resulted as follows: Chm., P. E. Butzen; 1st V.-Chm., J. J. Ebner; 2nd V.-Chm., N. V. Husting; Secy., H. G. Heimann; Treas., A. G. Gudert; Delegate, A. R. Gieringer; and Alternate, R. H. Ford.

Happy about their new offices are the Los Angeles Chapter executive group. Left to right, seated: G. J. Walkey, 2nd V.-Chm.; Anton Peck, Delegate; L. F. Hawes, Chm.; R. G. Stronks, 1st V.-Chm.; and R. H. Powroznik, Treas. Standing: D. R. Linch, Constitution and By-Laws Chm.; M. W. Seavey, Standards Chm.; H. L. Miller, Alternate; H. S. Bamberger, Education Chm.; Rudolf Regen, Editorial and Public Relations Chm.; C. L. Wight, Indust. Relations & Asst. Secy.; J. A. Parks, Secy.; R. H. Kollenborn, Membership Chm.

Stylist Streamlines Machine Design

Elmira, N. Y.—Better tooling was the subject of a slide-illustrated lecture presented by A. W. Meyers, Asst. Director of Design at Brown & Sharpe Mfg. Co., Providence, R. I., before a meeting of Elmira Chapter held recently in the Mark Twain Hotel.

An experimental machine, covered with wires, controls and gadgets was shown in comparison with the finished product after the stylist had groomed it for market. Similarly contrasted were a standard milling machine of the past and a current model. The new machine had controls centralized with the shape of the knob denoting function and the movement of the lever the direction. Other improvements in styling, fixtures and safety devices were also shown.

Election of officers featured the preceding business meeting with the following chosen to serve through 1947-48: Chm., Edward Stachel; 1st V.-Chm., J. F. Deegan; 2nd V.-Chm., B. J. Seifried; Secy., H. C. Halliday; Treas., P. J. Pecoraro; Delegate, F. B. Allen; and Alternate, J. R. Lynch.

Explains Electric Gaging

Providence, R. I.—Approximately 100 members and guests of Little Rhody Chapter heard L. A. Mooney, Special Products Div., General Electric Co., Schenectady, N. Y., explain the principles of electric gaging at their Annual Meeting.

Another speaker, Member Robert Parker, gave an informative description of farming in Vermont.

Officers chosen for the ensuing year are: Chm., W. J. Pender; 1st V.-Chm., R. B. Parker; 2nd V.-Chm., D. C. Krahnke; Secy., Jack Marsden; and Treas., F. H. Cary.

Hawes Installed Chairman

Los Angeles, Calif. — Installation of officers featured the March 13 meeting of Los Angeles Chapter, the oath of office being administered to L. F. Hawes, Chm.; R. G. Stronks, 1st V.-Chm.; G. J. Walkey, 2nd V.-Chm.; J. A. Parks, Secy.; R. H. Powroznik, Treas.; Anton Peck, Delegate; and H. L. Miller, Alternate.

J. V. Winkler

J. V. Winkler, M.E., gave a film-illustrated talk, "What Is Magnesium?" His discussion of the refining and fabricating of the light weight metal included concrete examples, formulae and figures.

"New Automobiles," a motion picture report of the problems facing the motor car industry, was presented by I. F. Alexander.

Multi-Slide Machines Make Intricate Parts

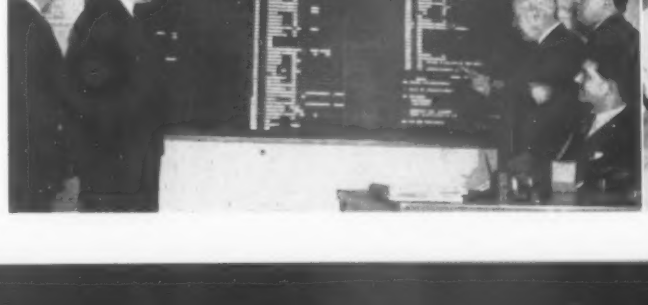
Erie, Pa. — With films, and a large display of strips and small parts, A. Melnick, Chief Tool Designer of U. S. Tool Co., recently demonstrated for Erie Chapter members that small, intricate sheet metal parts can be made successfully and economically on multi-slide machines.

His discussion of the part that these machines can play in industry impressed his audience with the variety of involved parts that can be stamped, formed and assembled on machines using cams and slides.

New officers elected during the dinner meeting are: Chm., M. H. Hetzel; 1st V.-Chm., V. A. Peck; 2nd V.-Chm., E. L. Kern; Secy., W. S. Cebelinski; and Treas., S. S. Sadoski.

Handbook Compilation Nears Goal Steadily

With most of the manuscripts for the "Tool Engineers' Handbook" received from the contributors and being processed, the Handbook Committee sees its long, arduous task nearing completion. Left, the Committee inspects progress revealed by the production chart at the Central Office. The 26 steps entailed in compiling each section are posted on the chart by the Handbook staff as each operation is performed. Publication is expected by the end of the year. From left: Harry Crump, Chairman E. W. Ernst, Frank Martindell, Ben Brosheer and Editor Frank W. Wilson (seated). Right: The Committee checks one of the more than 100 manuscripts comprising the Society's first Handbook. At left in this view is Committeeman Adrian L. Potter



Clare Bryan, retiring Chairman, swears in new officers at Chicago Chapter's March meeting. From left: Fred J. Schmitt, Chm.; Harold Taylor, 1st V.-Chm.; Anton Schwistor, 2nd V.-Chm.; Ray Erickson, Secy.; and Frank M. Kincaid, Treas.

Top: Philadelphia Chapter officers-elect take their places for the installation ceremonies during the March meeting. From left: W. Warren Cady, Secy.; Harold F. Holden, Treas.; Emil Kitzman, 2nd V.-Chm.; Samuel R. Boyer, 1st V.-Chm.; Arthur R. Diamond, Chm.; John A. McMonagle, Delegate; and P. A. Paterson, Alternate. Below: Clarence H. Hopper of A.C.F. Brill Motors Co., technical speaker for the occasion, illustrates his address on bus manufacture with model and drawings of de luxe motor coaches of the future

Busses Pose Problems In Limited Production

Philadelphia, Pa. — The coordination, balance and efficiency necessary in the relatively limited production of custom built motor coaches were described in detail by Clarence H. Hopper, Production Manager, A.C.F. Brill Motors Co., before a recent gathering of Philadelphia Chapter members at the Engineers Club.

Mr. Hopper, in explaining "Competitive Motor Coach Manufacturing," completely covered design engineering, experimental work, tooling, methods engineering, plant and facility engineering, production and material control, manufacturing and assembly.

From time to time, he pointed out opportunities available in the motor coach industry for suppliers of dies, tooling and engineering service.

In conclusion he predicted new comforts and luxuries in the motor coach of the future, such as complete air conditioning, radio, buffet, lavatory, arm chair type seats, lounge and observation car type rear platform and possibly double deck sleepers.

The speaker continued answering questions after the adjournment of the meeting.

Prior to the technical session, the following Chapter officers were elected: Chm., A. R. Diamond; 1st V.-Chm., S. R. Boyer; 2nd V.-Chm., Emil Kitzman; Secy., W. W. Cady; Treas., H. F. Holden; Delegate, J. A. McMonagle; and Alternate, P. A. Patterson.

Improved Surface Finish Extends Auto Motor Life

Boston, Mass.—Honing and polishing of all engine parts, eliminating the "breaking in" of new cars at low speeds, was credited with lengthening the life of automobile engines, by Louis M. Nielsen, Industrial Engineer at General Electric Co., River Works, West Lynn, speaking before more than 160 members and guests of Boston Chapter at a recent meeting in Schrafft's Restaurant.

Mr. Nielsen, a Chapter member, was the first speaker on the theme, "Machining and Measurement of Fine Metallic Surfaces." He opened his discussion, "Specifications and Interpretation of Surface Finishes," by recalling when surface finishes were described by such generalities as "rough," "semi," and "fine." Some of the earlier methods for determining surface finish, he added, were very simple and are still good, such as the fingernail and tooth tests.

The term "superfinish," used to describe a surface honed with a very fine stone and plenty of lubrication, must be qualified, said Mr. Nielsen, emphasizing the necessity for standards of value. He recommended specimen blocks with grades of finish indicated thereon to eliminate misunderstanding between various plants.

The holder of more than 75 patents on lapping machine design, H. S. Indge, Lapping Development Engineer for Norton Co., Worcester, drew from his wealth of experience for a talk on lapping machine parts and surface finish.

While lapping is one of the oldest arts, having been used to precision fit the stones of the Pyramids, it remained for Mr. Wills of the Wills-St. Claire company to introduce it to the automobile industry some 25 years ago, with the lapping of wrist pins. The plant producing them developed a process for lapping 30 or 40 pins at one time with a one microinch finish. This measurable accuracy brought a high degree of interchangeability of parts.

New Officers Installed By National Secretary

Rockford, Ill.—New officers for 1947-48 were installed at the March 6 meeting of Rockford Chapter by G. C. Johnson, National Secretary.

Participating in the installation ceremony were: Chm., E. Y. Seborg; 1st V.-Chm., H. A. Nelson; 2nd V.-Chm., K. B. Kaiser; 3rd V.-Chm., G. H. Rigeman; Secy., E. A. Norrman; and Treas., G. P. Torrence.

Motion pictures were shown afterward, and the 125 members present enjoyed a smorgasbord.

T. B. Carpenter of Detroit, a Past President, was a guest at the meeting.

* * *

A joint meeting with the Rockford Junior Association of Commerce took place the month previous, with an attendance of approximately 225.

The program, planned by the "Jaycee's," consisted of a showing of General Electric's "House of Magic," presenting electrical phenomena discovered by scientists in the G. E. laboratories.

The experiments employed strobiscopic light which makes articles revolving at high speed appear to be standing still. Other experiments showed paper desks exploded at high speeds and electric eye demonstrations.

At the conclusion of the joint meeting, the ASTE group elected officers.

Rigid Initial Inspection Key to Quality Control

Poughkeepsie, N. Y. — Thorough inspection of the first piece of a production setup is the keynote of quality control, J. B. Wilkie, Pratt & Whitney Sales Engineer, emphasized in an address, "A Practical Application of Quality Control," before 118 members and guests attending the March 5 dinner meeting of Mid-Hudson Chapter.

Explaining that quality control is a tool of management to reduce cost and improve the product—vital in today's competitive market—he stated that the subject requires deep study and gains momentum as it proceeds.

General practice, he said, is to change the name, "Inspection Dept.," to "Quality Control Dept.," with the Chief Inspector responsible to top management. Great care is necessary in installing such a system, setting up one operation and department at a time.

The speaker supported his talk with colored slides, showing operations and quality control as set up at Westinghouse. A lively question and answer period followed and an exhibit of Electrolimit and Air-O-Limit External and Internal Comparators was inspected by the group.

Installation of the following officers preceded the technical session: Chm., J. L. Petz; 1st V.-Chm., L. H. Tenney; 2nd V.-Chm., William Freer; Secy., Thomas Bircher; and Treas., Noel de Cordova.

Shows Sapphire Bearings

Racine, Wis.—Roger F. Waindle, General Manager of Sapphire Products Div., Elgin National Watch Co., Aurora, Ill., addressed a recent dinner meeting of Racine Chapter in the Manufacturers Association Building.

His subject was "Sapphire—An Engineering Material," illustrated with a color-sound film showing the manufacture of sapphire bearings for mechanical instruments and gages.

R. F. Waindle

* * *

Speaker for the previous meeting was Richard Lane, Chief Field Engineer for Macklin Grinding Wheel Co. of Jackson, Mich.

Mr. Lane's lecture dealt with the origin, development and application of grinding wheels.

New Automatic Lathes Cut Production Time

Chicago, Ill.—"What's New In Turning Equipment" was reported to more than 200 Chicago members and guests by S. A. Brandenburg, Sales Manager for Monarch Machine Tool Co., in a recent address before the group.

Mr. Brandenburg's presentation, emphasizing the use of automatic lathes, was accompanied by slides and films illustrating machine tool design. He laid particular stress on higher speeds and coarser feeds and the importance of loading and unloading time.

After the newly-elected officers were introduced and installed, Chairman F. J. Schmitt announced his plans for the coming year.

Sundstrom Describes Tooling for Plastics

Erie, Pa.—C. A. Sundstrom, Products Engineer, Plastics Div., General Electric Co., Pittsfield, Mass., was the principal speaker at a recent meeting of Erie Chapter in the General Electric Community Center.

C. A. Sundstrom

Mr. Sundstrom's talk, "Phenolic Plastic Products and Tools," was illustrated with the G. E. film, "The Kingdom of Plastics," and a display of samples. The speaker described the growth of the plastics industry during the past six years. Interest in his topic was evident from the many questions asked during the discussion period.

Harry Joyce, registered engineer, spoke on the organization of an Engineering Council for Erie, a project which he and A. H. Morey, ASME Chairman, and Lanier Greer, AIEE Chairman, have been promoting.

Mr. Joyce referred to the Erie Technical Federation, an organization existing some 15 years ago, which sponsored many civic improvements. Through their respective Chapters, Mr. Morey and Mr. Greer have been carrying out an extensive vocational guidance program in the Erie high schools.

It was pointed out that this type of program could be greatly expanded under the sponsorship of an Engineering Council composed of all the local technical society chapters.

Modern Machine Design Challenges Ingenuity

Toronto, Ont.—A new challenge to the machine tool industry and to tool engineering was outlined by A. W. Meyer, Assistant Director of Design, Brown & Sharpe Mfg. Co., Providence, R. I., before 175 at a meeting of Toronto Chapter. Even though they met the challenge of the war, he said, they must now go on to greater achievements.

The talk was illustrated by beautifully-produced slides of latest model milling machines, grinders and ingenious high production fixtures.

Machine design has progressed in the direction of greater rigidity, simplified controls, safer operation, and ultimately to turning out a better product at lower cost. Modern styling has replaced the gingerbread decoration of earlier days, with outlines that have attractive appearance built in as a partner of utility.

General purpose tools with adequate fixtures replace single purpose machines to achieve flexibility of product design with very little at stake in special equipment.

Tool engineering of the highest order was shown in the design of high production slotting, indexing and milling fixtures, in many of which cutting tools were in action 79-83 and even 93% of the operating time.

"Up and Over," a sound film produced by American Monorail Co., showed modern and sometimes fabulous handling methods with monorail equipment. The story was climaxed by an electronic control, still in the experimental stage, for controlling from the floor all six motions of the hook, with no wire connection between operator and motors.

Lists Essential Points In Choosing Alloys

Portland, Ore.—G. K. Dreher of San Marino, Calif., was the speaker of the evening at a recent meeting of Portland Chapter in the Congress Hotel.

His subject, "A Practical Approach of Non-Ferrous Metals," concerned the characteristics and usage of these alloys.

Mr. Dreher pointed out that much of our present knowledge of such alloys and their development has taken place since the first World War. Emphasizing the danger of "over selling" the use of non-ferrous alloys, the speaker stated that such a policy would only react unfavorably for the industry.

Thirteen points were enumerated as important in the selection of the proper alloy for a job. The exercise of good judgment in choosing alloys was stressed. After his talk, Mr. Dreher answered many questions.

At the conclusion of the main technical feature, the audience enjoyed the showing of "Golden Horizons," a Kodachrome sound film furnished through the courtesy of Ampco Metals, Inc.

Officers elected during the business meeting are: Chm., W. E. Brennan; 1st V.-Chm., N. B. Williamson; 2nd V.-Chm., C. J. Sharkey; Secy., W. T. Brandenburg; Treas., R. S. Richards; and Delegate, G. E. Healy.

Reports Enemy Progress In Machine Tools

Pittsburgh, Pa.—A. D. Einig, General Manager of the Motch & Merryweather Machinery Co., Cleveland, Ohio, gave Pittsburgh members a graphic report on "Observations in Respect to Machine Tools in the Combat Areas of Europe and the Orient."

Mr. Einig's address, supplemented with a film, was delivered before nearly 100 members and guests attending a recent dinner meeting in the Fort Pitt Hotel.

The pictures were taken during Mr. Einig's trip abroad as a part of the Pauley Committee appointed by the President to make a study and report concerning reparations and other pertinent information pertaining to industrial conditions as they had existed in the now occupied countries of our former enemies.

Dwight Bardes, Robert Ford and Gardner Young were selected to serve as a Chapter Nominating Committee.

Grinding Now Eliminated In Drill Flute Finishing

Elmira, N. Y.—Stanley Horosco, Vice-President, Republic Drill & Tool Co., N. Y., gave an illustrated talk on "Shankless Twist Drills" before a group of Elmira members at a recent dinner meeting in Mark Twain Hotel.

Mr. Horosco showed an excellent film, picturing the main points in the manufacturing methods employed. An interesting development was revealed in the finishing of the drill flutes. Originally, because of decarburization of the grooved stock during processing at the steel mill, it was necessary to develop an automatic flute grinder to remove the surface of the flutes. With the overcoming of the decarburized surfaces by the steel mill, Republic has developed an entirely new process eliminating the grinding operation.

Samples of shankless twist drills were exhibited by the speaker.

Officers Visit Potomac

Retiring President A. M. Sargent and his successor, W. B. Peirce, are election night guests at Potomac Chapter. Left to right are: R. E. Plitt, outgoing Chapter Chairman; Mr. Peirce, E. M. Seifert, a former Director; Mr. Sargent, Fred J. Heid, Vice-President in Charge of Sales for Verson Allsteel Press Co.; and R. R. Thayer, incoming Chairman. Mr. Sargent and Mr. Peirce spoke concerning the Society, its history and aspirations. Mr. Heid gave a film-illustrated lecture on modern presses and their application

Having a good time themselves at Toledo Chapter Annual Ladies Night are John Preas, William Jay, Chairman; and Ray Clapp, all of the Entertainment Committee in charge of the affair. Samuel Burgess, another committeeman, is seated elsewhere

Mystery of Stratosphere Veils Unknown Power

Cincinnati, Ohio—In the stratosphere lie swift routes between nations and "broad highways to new continents in physics and industry," according to Brig. Gen. David Sarnoff, President of the Radio Corp. of America.

The moon and planets will be used as sounding boards and mirrors for radio and television broadcasts, he predicted in a recent address before the Cincinnati Technical and Scientific Societies Council of which Cincinnati Chapter, ASTE, is a member.

A high speed missile, loaded with germs or explosives, can be guided with precision across oceans, and the complacent nation that ignores the swift advances of science courts disaster, Gen. Sarnoff warned.

"At the new altitudes, man must seek and find the faith and inspiration that will enable him to express the true purpose of science—a good life and lasting peace for all mankind," the speaker concluded.

131 Couples Entertained

Toledo, Ohio — The annual Ladies Night dinner dance and party recently held by Toledo Chapter at Heather Downs Country Club was enjoyed by 131 couples. About 50 door prizes were distributed to lucky ticket holders.

The affair was under the direction of the Entertainment Committee: William Jay, Chm., John Preas, Ray Clapp and Samuel Burgess.

Natl. Asst. Secretary-Treasurer William A. Dawson (left) presents Chapter gavel to Lyman M. Jardine, incoming Chairman of Toronto Chapter. Other officers, from the left, are: Russel S. Kartzmark, 2nd V.-Chm.; John W. Lengbridge, 1st V.-Chm.; Fred R. Cook, 3rd V.-Chm.; and John B. Burk, Secy. (Absent, Harold C. Upton, Treas.)

Relates Extreme Precision Required for Gun Tooling

Toronto, Ont. — The highly efficient tooling used to produce wartime guns was explained by Clare Bryan, Consulting Tool Engineer for Link-Belt Co., Chicago, to an interested audience of 220 Toronto Chapter members gathered March 10 at Malloney's Art Gallery.

Tolerances of tenths on large castings, the speaker stated, called for designs as nearly perfect as possible. Jigs and fixtures with rotating spindles and bushings were checked periodically for wear. By using a heavier oil, slight wear on these rotating members could be rectified. Where rotation could cause wear, high speed tools were used rather than carbides. By keeping speeds within reasonable limits and changing oil occasionally, the fixtures were still in operation when the war ended.

Hydraulic clamping to reduce handling time proved very effective in these operations, some operations being cut 45%. Heat and distortion were discussed during the question period.

W. A. Dawson, Asst. Secy.-Treas., installed as Chapter officers: Chm., L. M. Jardine; 1st V.-Chm., J. W. Lengbridge; 2nd V.-Chm., F. J. Crook; 3rd V.-Chm., R. S. Kartsmark; Secy., J. S. Burk; and Treas., H. C. Upton. Mr. Dawson also presented a Past Chairman pin to retiring Chairman Walter Appleton.

* * *

"The Professional Aspect of Tool Engineering" was presented by Otto W. Winter, National Education Chairman, at an earlier Chapter meeting.

Drawing a parallel between college trained men and tool engineers who acquired their education in extracurricular courses, he pointed out that the latter have practical experience which the graduate engineer must attain through several years of shop work.

Modern mass production, he stated, is possible only through the efforts of tool engineers.

Election of officers was held during the evening.

J. B. Savits (left), retiring Chairman of Boston Chapter, and A. A. Nichols (right), another Past Chairman now serving on the National Program Committee, greet Clifford E. Stubbs, industrial designer, as he arrives to address Chapter

Industrial Design Theory Valuable to Tool Engineer

Boston, Mass.—Why industrial design should interest the tool engineer was graphically demonstrated to Boston Chapter members by C. E. Stubbs, Industrial Designer and Senior Partner in Henry A. Loudon, Advertising. Mr. Stubbs gave the principal address at a meeting in Schrafft's Restaurant recently.

Exhibiting a homely object widely used, Mr. Stubbs cited it as an example of a utility product which has had no design improvement. After quoting results of an imaginary "market survey," he showed with large free hand sketches how improvements desired by consumers could be incorporated.

He also outlined the principles of good industrial design, showing colored slides of before and after designs of certain industrial products.

Gadget talks were given by Morris Bangs, Development Sheet Metal Foreman at General Electric Co., Lynn, who described "An Inexpensive Method of Embossing and Piercing Light Gage Sheet Metal," and R. H. Alden, Tool Designer at Raytheon Mfg. Co., Waltham, who told of primitive methods of accomplishing results impossible with present procedure. Two of these ideas concerned vegetables. An onion, he said, rubbed on metal surfaces will prepare them so that ordinary glue will make them adhere, while a potato pushed on one end of a shank will keep it cool while heat is applied to the other end for brazing.

J. M. Cannon, ASTE Public Relations Director, spoke on Society public relations, national and local.

Three-dimensional pictures shown by Worcester Film Corp., were viewed through glasses with polarized inserts.

Chapter officers elected during the meeting are: Chm., J. X. Ryneska; 1st V.-Chm., W. W. Young; 2nd V.-Chm., J. P. Crosby; Treas., A. J. Leone; Secy., W. C. Swanson; Delegate, A. D. Forbes; Alternate, A. A. Nichols; Councillors to Engineering Societies of New England, R. I. Robbins and Walter Pohle.

Coming Meetings

FLINT—May 15. Subject: "Grinding Wheels and Other Abrasives, Their History and Development."

HARTFORD — June. Annual Hartford Night.

LITTLE RHODY—May 21, Oates Tavern. Speaker: R. S. Woodbury. Subject: "Internal Combustion." June 18, place to be determined. Annual Outing.

MILWAUKEE—May 14. Subject: "Shot Peening."

PHILADELPHIA—May 15, Allegheny Ludlum Night. Speaker: Dr. G. M. Butler. Subject: "The Manufacture and Uses of High Carbon, High Chrome, and Carbon Tool Steels." June. Time and place to be announced. Outing, golf, dinner, entertainment.

ST. LOUIS—July 26, Tamme's Grove, Fenton, Mo. Annual Stag Picnic.

TOLEDO—June 11, Highland Meadows Golf Club. Annual Golf Frolic.

TORONTO—June 27, Elms Golf and Country Club, Thistledown. Annual Field Day.

Percussion Welding Joins Vastly Dissimilar Metals

San Diego, Calif. — "The Application of Welding Processes" was the technical subject at a recent dinner meeting of San Diego Chapter, held in a plant cafeteria of Consolidated Vultee Aircraft Corp.

T. E. Piper

T. E. Piper, Chief Process Engineer of the Northrop Aircraft, Inc., Hawthorne, was the speaker. In his talk, Mr. Piper touched on a relatively unknown phase termed "percussion welding." Using this type of welding, he said, it is possible to weld together any two known metals. As a concrete illustration, he submitted for inspection a rod composed of welded segments of widely dissimilar metals, SAE 4130, magnesium, cast iron, copper, stainless steel and aluminum alloy.

The Northrop developments in heliarc welding were outlined, together with their applications to aluminum, magnesium and stainless alloys.

Throughout his talk, Mr. Piper stressed the need for adequate jigs and fixtures. Jigs should be sufficiently rigid to prevent warping and distortion of the work, yet retain as nearly as possible its thermal expansion characteristics so that the jig itself will not introduce strains into the welded assembly.

An interesting open discussion closed the meeting, attended by 90 members and guests.

Obituaries

Carl Werscheid

Carl Werscheid, 57, Sales and Service Engineer for Allegheny-Ludlum Steel Co. in Missouri, Arkansas and Kansas for the past ten years, recently passed away.

Carl Werscheid

For 25 years, he had been known in the St. Louis territory through his dealings in tool steels and stainless steels. His practical knowledge in this field was first acquired at Western Cartridge Co. during World War I.

Mr. Werscheid had been a member of St. Louis Chapter, ASTE, for five years. At the time of his death, he was an active member of its Editorial Committee. He was also a past chairman of St. Louis Chapter, ASM.

Frederick W. Brehmer

Frederick W. Brehmer, 66, Founder and President of the F. W. Brehmer Machine & Tool Co., Cincinnati, recently succumbed to a heart ailment at his home in that city.

A pioneer in the Cincinnati toolmaking industry, Mr. Brehmer formed his firm 35 years ago. Born in Newport, Ky., he had lived in the Ohio city for 16 years.

He was a graduate of the Ohio Mechanics Institute and attended Purdue University. His affiliations included Cincinnati Chapter, ASTE; Robert Burns Lodge of Masons, Kosair Commandery, Knights Templar; and the Shrine.

GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

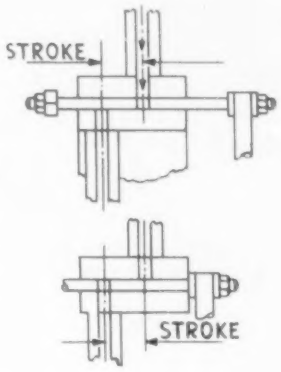
Cut-Off for Hoppers

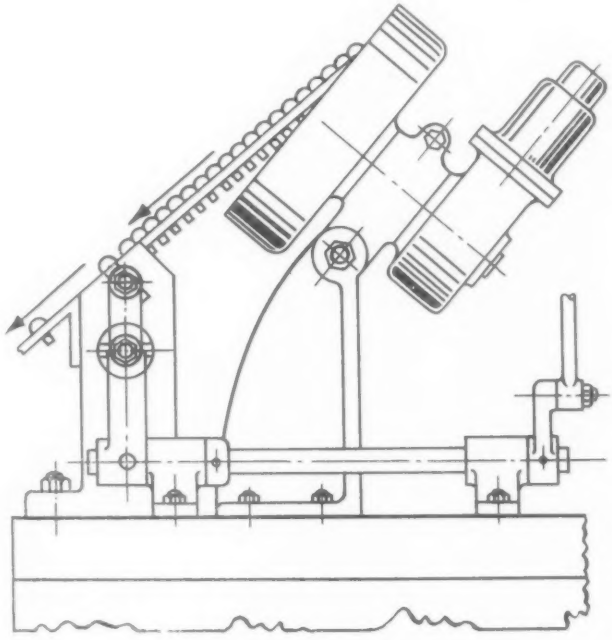
THE GADGET SHOWN can be used with drilling machines or punch presses to feed one or several screws or rivets from standard hoppers. While shown for single delivery, a second slider, immediately below the one shown, will divert two rivets, and still another below that will divert three or four as desired. A stop collar aligns the slot in the slider with the main chute from the hopper, while alignment with the discharge chute is effected with an adjustable stop screw. See detail at right.

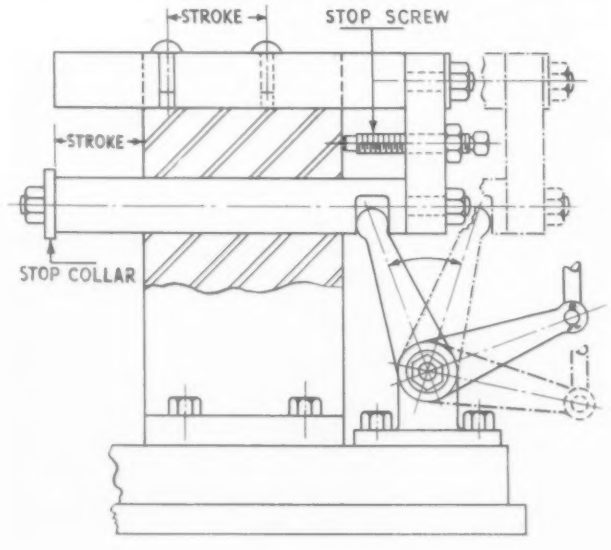
The slider is actuated by an eccentric on the crankshaft, if used on a punch press, or with a rod on the spindle quill, if used with a drill press. A slip joint may be necessary, depending on the stroke of the machine and possible overstroke. In the latter case a spring should be provided to insure pressure, against the stops, on both down and up strokes.

The tool is easily made from rectangular and round stock. A rocker arm actuates the slider. The slot in the slider should be slightly larger than the body diameter of the screw or rivet; however, a slot 25/64" wide will serve for either 5/16" or 3/8" rivets, but not for 1/4" or smaller.

Contributed







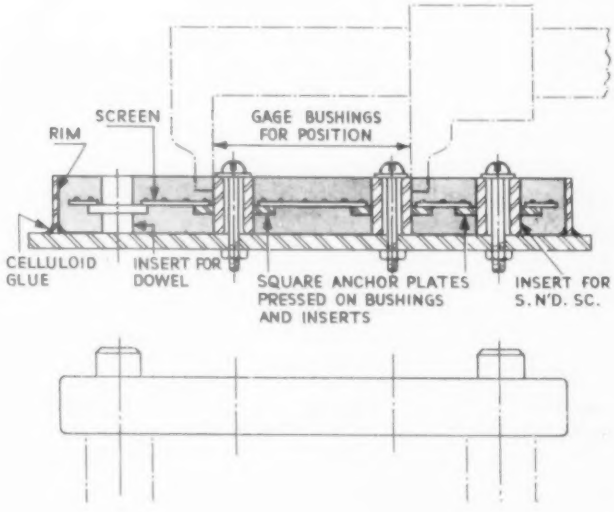
"Plastic" Drill Jig

HERE IS AN IDEA for a temporary drill jig for short production runs, or when the cost of jig must be kept down. No jig boring is needed, and it should be reasonably accurate for ordinary jobs. For construction, a plate is needed, C.R.S. or anything handy which is reasonably flat. On this plate, the drill bushings and inserts for fastening screws and dowels are clamped.

Clamping can be done with C-clamps or screws through the holes in the plate drilled to approximate positions. On the bushings and inserts, small square anchor plates are pressed as shown in sketch. Also, a piece of heavy steel screen is used for added strength of drill plates. All steel parts should be clean and free from oil to make an effective bonding with the cement.

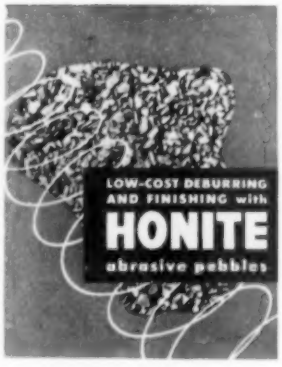
When all parts are assembled on the plate, the rim is glued on with celluloid glue. Then, a plastic—such as Plasticarve, described on page 41, February *The Tool Engineer*—is poured in; or, a concrete mixture made of Portland cement and suitable sand, or cement alone may be used. It should set about 2 to 3 hours. When set, it can be removed from plate and, after aging for a few days, a coat of some durable paint is applied and it is then ready for assembly to the jig proper.

W. Palmer
Toronto Chapter, A.S.T.E.



BULLETINS AND TRADE LITERATURE

Items briefed herein have been carefully selected for their interest and application. Unless otherwise stated, all are available, free, from the stated sources.



MINNESOTA MINING & MFG CO., St. Paul 6, Minn., in their booklet, *Low-Cost Deburring & Finishing with Honite Abrasive Pebbles*, explain that the action of Honite abrasive stone material (when mixed with lubricant and used in a tumbling barrel) is due to the metal projections on the work rupturing the protective film and thus exposing irregularities to the thorough abrasive action.

GEORGE F. BUB & SON, 11413 Madison Ave. (Boulevard 1818), Cleveland 2, Ohio, has issued *Standard Parts Catalog No. 2*, describing the Bub line of hand knobs, quarter turn screws, as well as other standard jig and fixture accessories and components.

Robbins Index Table is the title of a folder by **ROBBINS ENG'G CO.,** 318 Midland Ave., Detroit 3, presenting their index table for fast, accurate indexing on production operations such as drilling, reaming, tapping, boring and milling.

LAPOINTE MACHINE TOOL CO., Dep't X-52, Hudson, Mass., has completed their 124-page *Instruction Manual*, containing descriptive data, plus complete instructions for installing, operating, servicing, and maintaining all Lapointe standard broaching machines.

SENTRY COMPANY, Foxboro, Mass., presents *Bulletin 1054*, telling about Sentry Electric Furnaces for use with the Sentry Diamond Block Method of atmospheric control for hardening high speed steel; and *Bulletin No. 1053*, which illustrates and describes all accessories used in applying this method.

JONES & LAMSON MACHINE CO., Springfield, Vt., announces a 28-page catalog, *Screens for Jones & Lamson Optical Comparators*, which includes photos, descriptions, and prices of the various types of comparator screens now standardized by that concern.

PRATT & WHITNEY, Div'n Niles-Bement-Pond Co., West Hartford 1, Conn., has three new booklets available: *Pratt & Whitney-Keller BL Machine*, *P & W Electrolimit Height Gage*, and *P & W Electrolimit Snap Gage*.

BAKER BROTHERS, INC., P. O. Box 101, Sta. F, Toledo 10, Ohio, in *Application Bulletin 2-1947*, explain how productivity can be increased with Baker drilling machines, keyseaters and cutters, boring and tapping machines, and contour grinders.

POMEROY STEREOGRAPH CO., INC., 305 Ferguson Bldg., Cleveland 14, Ohio, has published *A Short Cut to Perspectives*, among other new folders on the subject, explaining how accurate perspective drawings can be quickly obtained from plan and elevation drawings by use of the Pomeroy Stereograph Perspective Drawing Instrument.

BOYER-CAMPBELL CO., 6540 St. Antoine, Detroit 2, describes, in its folder, *Granny Grip*, a cam-lever mechanism and chain, by the same name, which lifts objects—such as steel barrels and steel plates—in a vise-like grip that grows tighter the heavier the load.

Q-C ENG'G PRODUCTS, 2842 W. Grand Blvd., Detroit, has compiled a 79-page catalogue, *Q-C Tool Engineers Reference & Standards Book*, explaining the Q-C Method which includes use of their Quick-Clamp Lock, "Standardized" drill jigs (both lock and spring clamping), milling vises, and a complete line of standardized units from which can be assembled fixtures of any size or type. The concern maintains an engineering department, and furnishes designs and tool jigs ready for use.

SUPER TOOL CO., 21650 Hoover Rd., Detroit 13, has released a 36-page *Catalog No. 47*—a most comprehensive listing of standard carbide tipped cutting tools, including the new ejector type tool bit.

Atmosphere Generators, a 12-page catalogue by **BELLEVUE INDUSTRIAL FURNACE CO.,** 2971 Bellevue Ave., Detroit 7, deals with both endothermic and exothermic types of furnace atmosphere generators and their application to a wide range of heat treating operations.

GEN'L ALUMINUM MFG CO., 3027 E. 55th St., Cleveland 4, O., has compiled an 8-page booklet, *Aluminum Permanent Mold & Sand Castings*, filled with valuable data for designers, metallurgists, and casting buyers, as well as those who plan substitution of aluminum for heavier metals.

SOUTH BEND LATHE WKS., 417 E. Madison St., South Bend 22, Ind., has described its 13" swing South Bend Quick Change Gear & Toolroom Lathes, as well as attachments and accessories in *Catalog 13-F*.

MONARCH MACHINE TOOL CO., Sidney, O., features its new "Speedi-Matic" high production hand operated screw machine in 20-page *Bulletin No. 1901*.

HOLUB INDUSTRIES, INC., Sycamore, Ill., has prepared a 10-page catalogue, *Motor Repair Equipment*, devoted to motor maintenance tools designed to conserve present equipment.

New 44-page *Caster Manual*, by **RAPIDS-STANDARD CO., INC.,** Dept. C-157, 308 Peoples Nat'l Bank Bldg., Grand Rapids 2, Mich., gives technical data on correct caster selection, and also includes descriptions of other materials handling equipment.

CROSS COMPANY, 3250 Bellevue Ave., Detroit 7, has a new 10-page bulletin, *Cross "60" Series*, which includes data on pointing and chamfering machines for use on spur, helical and bevel gears, as well as splines.

GOOD READING

A Guide to Significant Books and Articles of Interest in the Trade Press

PLASTICS MOLDS, by Gordon B. Thayer deals with the design, manufacture, and especially the use of molds.

This 272-page book, now in its 3rd edition, has been somewhat enlarged, revised, and brought up-to-date, having been originally copyrighted under the title, "Plastics Mold Designing" in 1941. Mr. Thayer, the author, who is also Plastics Research Engineer at The Dow Chemical Co., has written the bulk of the book himself, but he has added other chapters compiled by various other experts in the plastics field.

There are several introductory chapters which define terms, and give requirements of design procedures, as well as practical points on mold design and construction. The book continues to be specific throughout. Materials for plastics molds, mold sinking, applications of mold base standards and molding of screw thread are some examples of detailed instructions. Also, mold sinking by hobbing, milling, the rotary head method, duplicating, along with the equipment required are all carefully described.

A "Nomenclature of Plastics Molding" is included at the back of the book. These 13 pages are rapidly becoming the accepted standard definitions in many technical schools, and they have already appeared in Modern Plastics' encyclopedia.

Profusely illustrated, with line drawings and many photographs, the books sells for $5, from the publishers, *Huebner Publications*, 2460 Fairmount Blvd., Cleveland 6, Ohio.

PRACTICAL MANAGEMENT, by the Editors of "The Iron Age," is a compilation of articles which appeared in that magazine—now bound into book form—dealing with various phases of successful job evaluation, time study, personnel and costing techniques for the large as well as the small plant.

In the foreword, it is explained that the aim of this new book is to provide ". . . . management with tools to mold better employee relationships, put production on the plane of highest efficiency, and keep red ink from the treasurer's report. 'Practical Management' purposely is written in simple, practical language so that the ideas it offers can be translated into action in the small plant as readily as in the large one."

This 138-page book is divided into four parts, namely, "Job Evaluation and Time Study," "Management," "Personnel," and "Production Control," the latter section containing some material on quality control.

For complete details on obtaining copies, and the cost involved, write Charles T. Post, Manager, Reader Service, *The Iron Age*, 100 E. 42nd St., New York 17, N. Y.

RESISTANCE WELDING MANUAL, Revised Edition, is now available from *Resistance Welder Manufacturers' Ass'n*, 505 Arch St., Philadelphia 6, at $3.00 per copy. Composed of 552 pages, this new edition is double the size of the previous volume, with 20 entirely new chapters added. Tables of recommended procedures have also been revised to bring them up-to-date with respect to present-day practice; and numerous additions, based upon research and experimental work conducted during the war production period, furnish operating data on materials not covered in previous editions.

MICROTECNIC, a new scientific magazine printed in Lausanne, Switzerland, announces that it will publish literature dealing with measuring and gauging techniques, optics, and precision mechanics as such developments appear throughout the world. A good start on this aim appears to have been achieved in the 96-page February issue—Vol. 1, No. 1. There is an interesting congratulatory message, and a note on the high calling of precision work, contributed by Prof. F. Tank, Rector of the Swiss Federal Institute of Technology.

"Paramount achievements," writes Prof. Tank, "in Precision Mechanics may be called for good reasons, 'Works of Art.' Only a great master can create them. To the expert, who sees in Engineering not only a possibility of earning one's living, but a human vocation serving higher and nobler ends, they convey a feeling of admiration and satisfaction, similar to that which all of us experience when contemplating the finest masterpieces of Nature, such as for instance a snow crystal, a butterfly's wing, or an eye."

Although the bulk of the following pages in this issue are written in French, there is a complete 24-page English translation of all articles. Where necessary, the text of French-written advertisements are likewise translated.

The feature article of this first issue has been written by Professor A. Picard, and is entitled, "The Fundamental Bases of Our Units of Measurement," wherein he refers to the Einstein theory, and presents an analysis of "time" as a unit of measurement. Other articles include those on such subjects as "Hydraulic Pressure Gauges," "Numetal—A High Permeability Alloy," and "Automatic Repetition Work and the Manufacture of Precision Apparatus."

The magazine will be published every two months, and subscriptions are now available at $12.00 per year from *Overseas Publishers' Representatives*, 66 Beaver St., N. Y. 4.

HIDDEN WEALTH FOR ALL, an article by Clarence L. Collens, Ch'man of the Board, *Reliance Electric & Eng'g Co.*, Cleveland 10, Ohio, is not only a plea for full utilization of our nations' machines, materials and methods, but a down-to-earth discussion on improving cooperative effort, as well as the strengthening of the desire to work harder, to win more.

Originally printed in the August '46 issue of "The Clevelander"—a journal of the Cleveland Chamber of Commerce—the article has now been reprinted in booklet form. The author emphasizes teamwork in the field of sports and he points to a football team, describing a player who, by dint of considerable effort, has scored a touchdown. It is unlikely, says the author, that his teammates would tell him to "take it easy" for fear of ruining the game. It seems they would be more liable to pat him on the back and ask for more touchdowns.

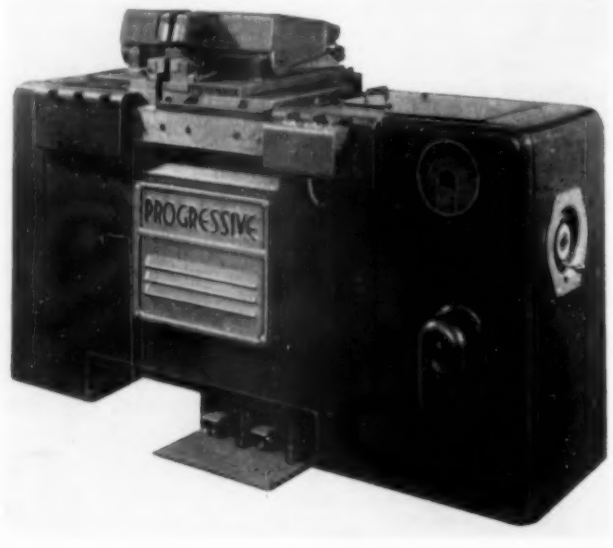
Similarly, in industry, the fear of working oneself out of a job must be removed; and the idea should be fostered that all of us, working together, must produce more and better products, and services, at lower and lower costs. Mr. Collens sincerely believes that management and labor can improve their teamwork. He concludes that if we put the same amount of effort into "humanology" (the science of effectively working together) that has gone into technology, we still will be headed in the right direction.

TOOLS OF TODAY

Improved Flash Welders

AN IMPROVED LINE of standard motor driven **FLASH WELDERS,** representing the most modern development in motor-upset flash welding equipment, is announced by *Progressive Welder Company*, 3050 E. Outer Drive, Detroit 12. These machines have been designed for precision flash welding of virtually any metal, including aluminum, for long periods at high production.

Combining both "universal" and specially engineered features, these machines provide a wide range of applications without major alterations in the basic units. Machines may be operated either ac, through transformers, or dc through the use of storage batteries. All units—including all electrical and mechanical units—are enclosed within the machine frame for greater cleanliness and reduced maintenance. Flat tops, on most of the machine types, tend toward more universal applications.



Convenience of setup and operation is an outstanding feature. Entire machine control is from only one position. Platen travel speed for flashing and upset, flashing voltage, amount of upset, die openings, and other necessary settings can be made within a few minutes. Once made, they are accurately maintained to assure duplication of weld performance.

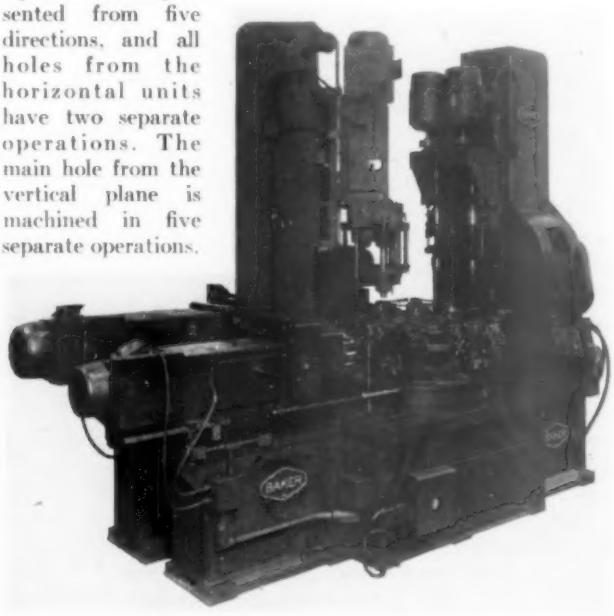
Among other noteworthy improvements, welding speeds have been materially increased by close coupling of the welding current, which provides increased efficiency and also results in higher welding current for a given flashing voltage. Another feature is the side rail construction of the moving platen which consistently maintains accurate product alignment.

The improved line is available in 4 capacities, from 20 kva to 150 kva, or they may be battery operated for any welding job that is within the physical capacity of the machine. Upset pressures are 2250 lbs., 4500 lbs., 11,500 lbs., and 19,600 lbs. for the four machine sizes; maximum stock width, vertical fixture, is 2", 4", 6", and 8"; and maximum tube O.D., vertical fixture, is 1", 1¼", 1¾", and 2¼".

Multi-Operation Machine

A MULTIPLE UNIT **MULTIPLE OPERATION TYPE MACHINE,** by *Baker Brothers, Inc.*, Toledo, Ohio, completes all drilling, boring, reaming, facing and tapping operations, in production of cast iron gas regulator bodies. The machine has a 4-station, automatic power indexing table, each station arranged for rechucking one part, and the chucking of one new part.

Around this index table are ten independently fed auxiliary units, consisting of four self-contained hydraulic units mounted in horizontal and vertical planes, one inverted rack and pinion fed unit, and five single spindle lead screw tapping units mounted in horizontal and vertical planes. Operations are presented from five directions, and all holes from the horizontal units have two separate operations. The main hole from the vertical plane is machined in five separate operations.



While especially designed for the Reliance Regulator Company, Alhambra, Cal., special machines of this type will increase productivity and cut costs in many industries. Great flexibility is demanded of this particular machine, which must accommodate itself to a variety of regulator housings. The following operation may be considered typical of wide applications.

Station 1, position 1, (horizontal unit) load one part, then machine drills flange holes either 8 or 10, 15/64" diameter; at position 2, (vertical unit) rechuck one part . . . a combination drill, coredrill and counterbore, .933 x .750 x .437.

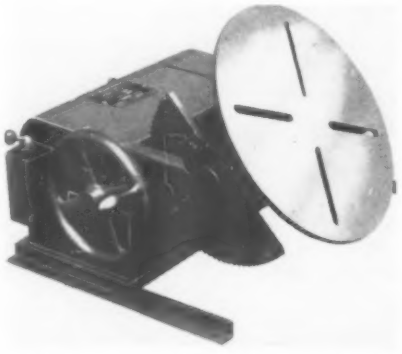
Station 2, position 1, angular unit performs combination drilling and reaming operation; then, left horizontal unit performs combination coredrilling and facing.

Station 3, position 1, rear horizontal unit coredrills; then, vertical unit performs a combination coredrill operation. At position 2, rear horizontal unit coredrills; then, vertical unit combines finish reaming and counterboring.

Station 4, position 1, rear horizontal unit taps 1½-12 thread; right horizontal unit taps either ¾", 1" or 1¼" P.T., and vertical unit taps ¾" P.T. At position 2, right horizontal unit taps either ¾", 1" or 1¼"; and vertical unit taps ¾"-16 thread.

Bench Model Positioner

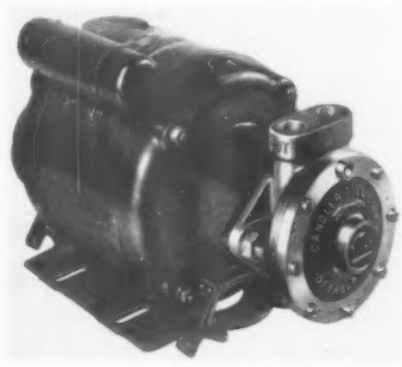
A POWER OPERATED bench model **POSITIONER,** Model 1-P, by *Ransome Machinery Co.*, subsidiary of Worthington Pump & Machinery Co., Dept. P-92, Dunellen, N. J., has been especially designed to meet demands for a faster and more efficient tool for positioning work weighing 100 lbs. or less. Built to handle small units, this versatile tool facilitates welding, assembling, repairing, grinding, hard surfacing and similar operations.



In common with other Ransome positioners, which range in capacities to 40,000 lbs., the Model 1-P may be tilted to 135° and works in any position. It may also be revolved 360° by a 1/8 h.p. single phase reversible motor, while a disengaging clutch permits free wheeling when desired. Speed range is from .21 to 5 r.p.m.

General Purpose Pump

Candler-Hill Corp'n. Division of Titan Pump and Engineering Corp'n, 405 Midland, Detroit 3, announces addition of another Titan **PUMP** to its line of fuel, lubricating and water pumps, here shown mounted directly on the end bell of an electric motor. This new model No. 4702 has been developed to fill a need for a pump to handle a variety of liquids in the medium flow, and pressure field where quiet, service-free life is a prime requirement. The pumping mechanism components are fabricated from appropriate corrosion-resisting materials to suit the type of liquid pumped.

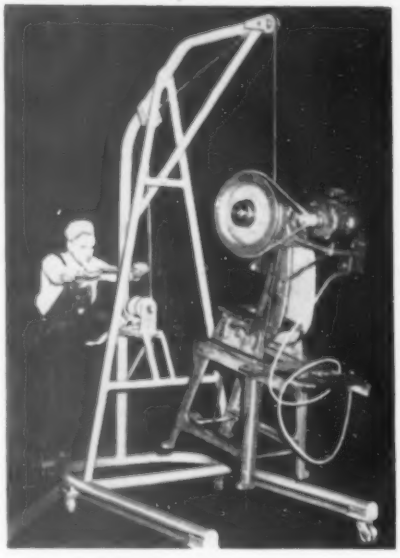


The rotating impeller is designed to "hydraulically float" in the housing. Thus, as there is no metal-to-metal contact between the rotating and stationary parts, long life operation is assured with very little loss of either flow or discharge pressure. Another feature is the ability to flow liquid directly through the pump when it is not operating. A by-pass or relief valve arrangement is not required; and, since a mechanical face type shaft seal separates the pumping chamber from a "lubricated for life" ball bearing, no further lubrication is required.

Pumping water at room temperature, and at shaft speed of 3450 r.p.m., the capacity of the standard production unit at 0 p.s.i. discharge pressure is approximately 100 g.p.m. Other pressure and volume requirements can be made available.

Mobile 1-Ton Hoist

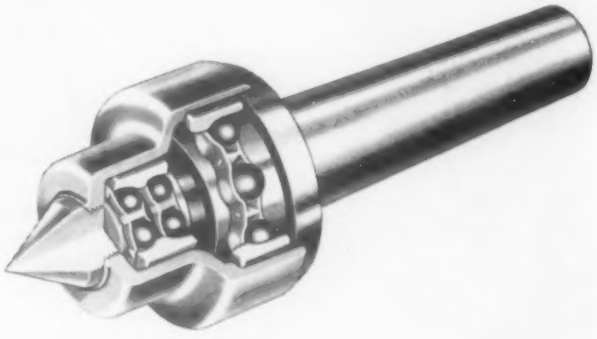
A MOBILE **HOIST** of 1-ton rated capacity, which can be used for transporting as well as lifting, is announced by *Almco Incorporated*, 231 E. Clark St., Albert Lea, Minn. Suggested uses of the hoist, which is known as the Almco Universal Hoist, include handling heavy chucks, dies and machine parts, hoisting cars for repair work, as well as loading and unloading trucks. The unit is of sturdy welded tubular steel construction, designed to withstand abuse, and rolls freely on four heavy-duty ball bearing casters. The U-shaped base goes easily into tight places, and only one man is required for both lifting and transporting.



This hoist can be furnished with a hand-operated worm-drive winch, as illustrated, or with an electric or chain hoist. It is regularly available in both 7 ft. and 9 ft. over-all height, the latter model permitting a total lift of 8 ft. 5 in. with the winch.

New Type Live Center

A NEW TYPE **LIVE CENTER,** with a replaceable alloy steel point ground true with the bearings, has been introduced by the *Sturdimatic Tool Co.*, 5216 Third Ave., Detroit 2. Characteristic of this design—and of all Sturdimatic engineered live centers—is a low overhang and a slight cushioning action that compensates for expansion due to heat, shock and excessive thrust loads which thus reduces wear to a minimum. Large thrust bearing takes all thrust load; large radial bearing takes only radial load. Standard shanks with Morse tapers are carried in stock; however, Brown & Sharpe, Jarno and other tapers may be supplied to specification.



Improved Soldering Flux

A NEW **SOLDERING FLUX** named Flux-Stik, by *Lake Chemical Co.*, 607 N. Western Ave., Chicago 12, promises to be a time and money saver on soldering operations. Non-acid and non-running, it quickly dissolves the oxides of metals and thus prepares a clean surface on which the solder may alloy itself with the material being soldered.

Because of its non-running characteristic, it can be applied equally well on both hot and cold surfaces, and to overhead or inaccessible spots. It can be used for sweat joints of copper or brass tubing, manifolds, traps, and the general run of other metal soldering.

High Pressure Gas Mixer

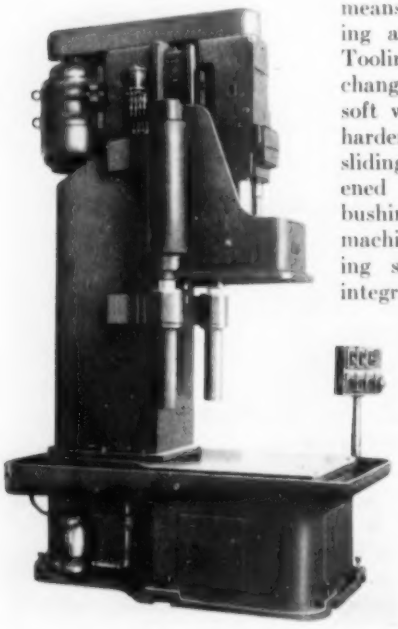
A **VENTURI MIXER** for high pressure gases, incorporating greatly improved mechanical design features, has been announced by the Industrial Div'n, *Bryant Heater Co.*, 17825 St. Clair Ave., Cleveland, Ohio. Known as the "Hijector," the new unit uses gas under pressures up to 35 pounds to entrain all the air needed for combustion, and to deliver the mixture to the burners at the highest possible pressure.

By reversing the usual procedure of the air shutter and locating it on the body, the orifice spud is accessible for removal without disconnecting any piping. Also, over-all length of the unit has been substantially reduced over conventional designs, and elements have been re-arranged for ease of servicing. The mixer is available in pipe sizes from $\frac{3}{4}$" to 4", and is suitable for use with all types of gases, including liquified petroleum types. Specifications and capacity tables, for gases ranging from 500 to 2,500 B.T.U. are included in Data Sheet 5B-1, available on request.

Automatic Drilling Machine

A NEW AUTOMATIC **DRILLING MACHINE**, by the *Robbins Engineering Co.*, 318 Midland Avenue, Detroit 3, is designed as a standard machine tool specifically for special purpose adaptations at low cost. This eliminates the expense of designing and building the basic machine, with the possibility of ironing out "wrinkles" after assembly of tooling.

Tooling heads, with any number of spindles, are mounted on the machine saddle by means of standard locating and hold-down holes. Tooling heads are interchangeable. Conventional soft ways are replaced by hardened and ground bars sliding in four large, hardened and ground steel bushings mounted on the machine column, thus making saddle and bars an integral unit and insuring ample rigidity plus long life.



In addition to the center tooling saddle, auxiliary units may be mounted around the base horizontally, vertically or at various angles; thus, a number of operations may be performed simultaneously with one clamping. Operating cycle can be varied to provide rapid approach, two adjustable rates of feed, dwell and rapid return, and stop.

Hydraulic power for the Robbins No. 3 Drillmatic is supplied from a compact, self-contained unit mounted at the top of the machine column, with all elements fully enclosed. Of particular interest—the pump control is so designed that only the amount of oil required to perform the operation is supplied through a variable delivery pump. As resistance to the machining thrust increases, the amount of hydraulic fluid is increased proportionately. The spindle will not jump forward when the tools break through; in addition, the saddle is fully counterweighted to provide smooth performance with less power.

Automatic Gaging Machine

AN "Airlectric" automatic **GAGING MACHINE** that checks the average outside diameter of shock absorber pistons, and segregates them into eight classes, has been developed by the *Sheffield Corporation*, Dayton, Ohio. The tool will check and classify pistons at the rate of 3600 per hour.

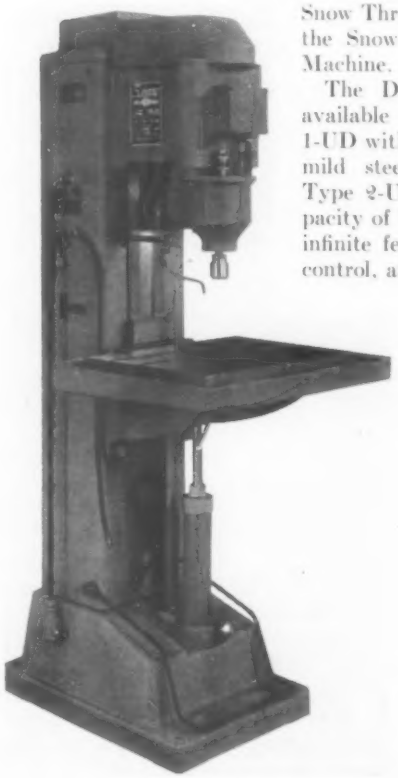
After being ground on a centerless grinder, the pistons proceed on a conveyor belt to the operator of the machine, who removes them from the conveyor and places them in a chute, so designed that the parts may only enter in the proper manner. The parts then proceed to the bottom of the chute, where they pass under an Electrichek gaging head which, in turn, actuates devices that automatically reject any excessively oversize parts. These parts can be salvaged and reground.

The remainder of the parts are removed from the Electrichek gaging station and inserted in a tungsten carbide air ring. This is connected to a series of "Airlectric" gaging heads that determine the size of the part, and light one of the individual signal lights located directly behind the chute. Each of the lights, which will only turn on if the part is within the minimum and maximum tolerance limits, has a prearranged color band around the diffusing lens to indicate the size of the piston. This permits the operator to determine the size of the pistons, and informs the grinder hand to what range he is grinding the parts.

Pistons are ejected from the air ring and, depending upon size, pass into the corresponding receptacle. Each piston is segregated and classified as to undersize, oversize, or one of the five acceptable classifications.

Air Tool

A NEW **AIR-OPERATED MACHINE,** said to be fundamental to drilling, threading and tapping operations, and named "Snow Air Tool" is a product of the *Snow Manufacturing Co.*, 615 S. California Ave., Chicago 12. This basic machine is air-operated, electrically-controlled, and functions at the touch of a button. Around this basic tool are built the Snow Drill Press, the Snow Threading Machine, and the Snow Universal Tapping Machine.

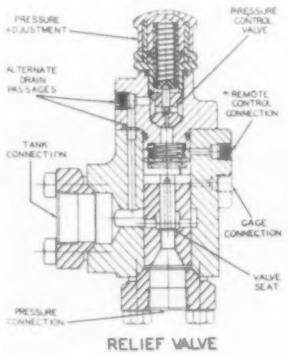


The Drill Press which is available in two sizes—Type 1-UD with a rated capacity in mild steel up to ¼", and Type 2-UD with a rated capacity of ⅛" to ⅜"—provides infinite feed, split-second drill control, automatic withdrawal of drill and elimination of drill breakage. The Threading Machine — sizes No. 3 and No. 4 — threads accurately, true to lead and thread form, gives a fine finish and long chaser life at extremely fast threading speeds.

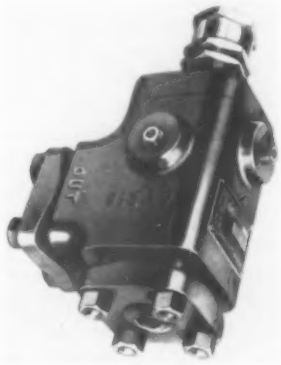
The Universal Tapping Machine which comes in four sizes: Type 1-UT with a rated capacity in mild steel No. 2 to 10 or 3/16"; Type 2-UT No. 6 to 5/16" N. F.; Type 3-UT No. 10 to ½" N. F.; and Type 4-UT ¼" to ¾" N. F. It enables precision tapping for any class fit to be easily accomplished with the correct pressure for every size tap and pitch.

High Pressure Relief Valve

THE *Superdraulic Corporation*, Dearborn, Mich., announces a new 5,000 p.s.i. **RELIEF VALVE** which is said to eliminate disadvantages of previous designs, and incorporate numerous new features. For example, the squealing and chatter characteristic of this type of equipment is said to have been completely eliminated, while instantaneous action prevents objectionable pressure peaks. Among important features claimed are accurate maintenance of pressure setting, and perfect hydraulic balance that insure high efficiency and long life. Provision is also made for remote control.



RELIEF VALVE



Sapphire Tipt Honing Tools

FOUR NEW SAPPHIRE tipt **HONING** and **BURNISHING TOOLS,** by *Sapphire Products Division* of Elgin National Watch Company, Aurora, Ill., have been announced by Roger Waindle, General Manager of the Division. These include two tools—lower left and upper right—designed for use with lathe or drill press and used with water as a coolant. The tool at *lower left* has proved its efficiency in sizing bearings, while the other (*upper right*) is designed to apply very high finishes to outside surfaces and counterbores. Like the first, it is a one-end tool, and both are made in diameters from .200" to .700".

Two sapphire tipt burnishing tools which feature double ends are also included. One of them (*left center*) has solid sapphire members protruding, and a round aluminum barrel with hexagon caps to protect the ends. Chiefly used for small parts' burnishing and honing, many thousands are already in use in the watch and instrument manufacturing field.

The other—*right center*—is a flat double-end honing and burnishing tool with solid sapphire inserts of two different grits. Used for larger and heavier work than the round barrel job, it efficiently accomplishes the chores of longer established diamond and carborundum tools. The manufacturer points out that the two manually-operated tools may be advantageously employed on the hardest steels and cemented carbides for the removal of burrs and feather edges.

Improved B & S Plain Grinder

ALL ELECTRICAL controls on the improved Brown & Sharpe No. 5 Plain **GRINDING MACHINES** are now fully enclosed, in a compartment on the right side of the machine, to give maximum protection, along with accessibility. While the headstock, table, grinding wheel, and coolant pump are driven by separate motors, a single dust and moisture proof push button switch, conveniently located on the control compartment at the right front, governs the starting and stopping of the whole machine.

The magnetic controls, individual motor overload relays, transformer for control system, and main line disconnect switch are all mounted in the compartment. When the lever on the compartment door is turned to allow the door to open, a safety device operates the main line disconnect switch and shuts off the current.

The cover of the control compartment is felt gasketed and designed to insure that any solids or liquids falling on top of the enclosure will be deflected from the cover gasket. The electrical equipment is applied to the machine in full accordance with Machine Tool Electrical Standards. Further information may be had from the *Brown & Sharpe Manufacturing Co.*, Providence 1, R. I.

Steel Stamp Equipment

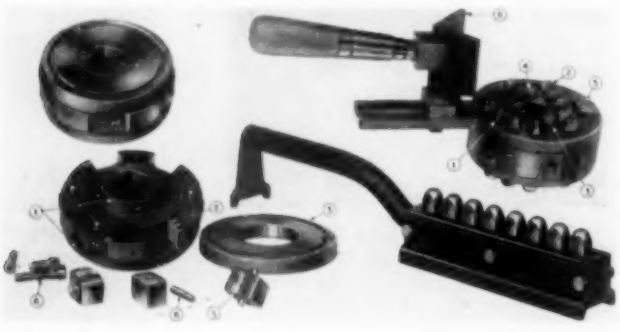
CALLED THE "Nu-Grip," a new **SAFETY STEEL STAMP,** featuring countersunk grip holes on all four sides of the stamp, is announced by *M. E. Cunningham Co.*, 169 E. Carson St., Pittsburgh 19. The indentations provide an exact contour fit, assuring a positive grip when the stamp is struck. Available in standard sizes from 1/32" through 1", these steel stamps are designed for all-round use, including the marking of tough alloy steels.

ALSO ANNOUNCED, by Cunningham, is a new **STEEL STAMP HOLDER** (lower right in photo at bottom of page) of one-piece solid alloy steel construction. In the double-line size, 14 steel stamps can be held at one time for the efficient marking of pipe, tubing, round or flat surfaces. Features include "floating springs," which hold the stamps firmly in place yet permit easy removal and insertion. A knurled pipe handle firmly retains the holder in position, and the special guide provides for easy positioning.

AN **INSERT ROLL** for tube marking (at left, in photo below) is another new Cunningham development, and includes: (1) Side ring and hub machined from high alloy steel; (2) type insert ring, mortised for number of inserts required; (3) locking ring which holds type inserts in place; and (4) Allen head set screws for locking insert ring to side ring. Inserts (5) are engraved with the face radiused slightly less than outside diameter of the type ring, and are held by steel pins (6) which fit into holes drilled into the side ring and locking ring.

This new insert roll includes the company's patented insert ring in which the engraved lettering is the same height as the solid sections between inserts. This provides sufficient friction for carrying the roll along the pipe or tubing, to properly space the lettering and to eliminate the "jumping" and resulting extra wear on front and back ends of letters as they make contact. Character life has been reported increased greatly.

A NEW **AXLE MARKER,** also a Cunningham development, provides for a complete marking setup at one time, and uses ordinary straight sided stamps as shown in sections marked (1) and (2), upper right, in photo. Friction springs, for holding the stamps in place, enable the operator to make quick changes by simply pushing out one stamp and inserting another. Sections (3), (4) and (5) are for month, year and company symbol respectively, and have a slot and retaining pin for holding them in place; while the "V" gage (6) is provided for positioning the marking on axles of different sizes. Although each stamp must be struck individually, this axle marker is reported to have decreased total marking time 25% to 50% over conventional methods.



New Modernair Cylinders

DEVELOPED AS A RESULT of detailed studies covering practically every possible application of air actuating cylinders to various machine functions, a new line of **NON-CUSHION TYPE AIR CYLINDERS,** by *Modernair Corporation*, 4222 Hollis St., Oakland 8, Calif., complements the company's presently manufactured line of cushion type cylinders. The new Modernair unit offers a more widely diversified use through the incorporation of several new features which modern industry has long needed.

Outstanding design factor is the utilization of threaded cylinder caps, sand cast of special aluminum alloy and properly heat treated to give high tensile strength and extreme resistance to pressure. Hence, a positive seal between the caps and the seamless brass cylinder barrel, is effected without resort to cumbersome tie-rods. This feature permits much easier application, due to the installation space saved. Another feature, of interest to cost-conscious engineers, is the fact that the Modernair unit permits the caps to be rotated 360° on the cylinder without affecting the permanence of the seal. This greatly simplifies installation plumbing, by eliminating, in most cases, the need for elbow or "T" fittings in connecting the line into or from the cylinder. Pressure and volume losses due to restricting fittings are thereby greatly reduced.

A further advance is the use of aircraft type "O" ring packings at every possible point of wear or leakage; hence, there is no metal-to-metal contact at any point of wear. Maintenance headaches are obviated, as the cylinder can be quickly and completely renewed by replacement of these easily serviced "O" rings.

Manufacturers will be pleased to know that while this Modernair cylinder is produced in a standard range of 2", 2½", 3" and 4" diameters, the stroke length is optional. Any stroke length desired can be quickly supplied to fit each individual stroke requirement.

Protective Coatings

TWO KINDS OF **PROTECTIVE COATINGS,** for steel marking tools and dies are announced by *Wm. A. Force & Co.*, 216 Nichols Ave., Brooklyn 8, N. Y. These are: (1) A glossy, ebony-hued finish which is placed on their tools to provide a protective coat for prevention of deterioration and corrosion. For protection against accidental marring of the face of the engraved characters, the company is using, (2) a transparent, plastic coating which can be easily peeled off before the tool is put to use.

This 12,500% increase *sounds fantastic!*

But True!

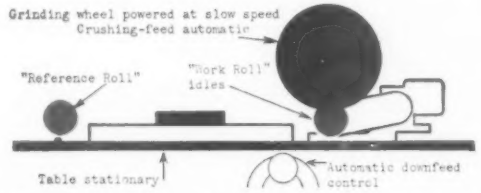
One of the major drawbacks to crush form grinding precision flat form contours has been the inability to produce on a practical production basis. This obstacle has been eliminated in two ways by the new Thompson Truforming Process.

First: Truform Grinders are engineered and built as a single unit, eliminating the failures of make-shift crushing arrangements and attachments.

Second: TWO CRUSHING ROLLS ARE USED. This is a major advancement, because it greatly extends crushing roll life and makes possible, for the first time, quantity production without constantly disturbing the set-up to re-process the crushing roll.

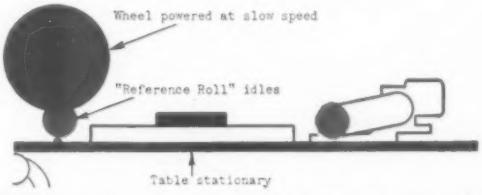
How two rolls operate in the Truforming Process is briefly illustrated and described below. The normal crushing or truing position is shown first.

Normal Crushing Position
Also Truing or Dressing



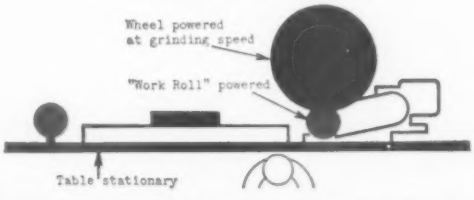
This is the position for the initial crushing of the wheel—and for subsequent truing or dressings when production grinding. On an eight pitch modified buttress thread form, 125 dressings were provided by the "work roll" before losing form.

Touching-up Position



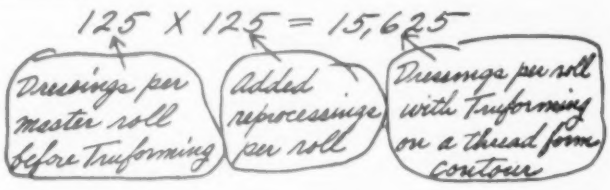
When the "work roll" loses form the table is moved to bring the grinding wheel over the "reference roll" for touching up, as shown above.

Re-processing Position



Because both rolls are table mounted, are in perfect alignment, and can be brought in the same relation to the grinding wheel, the original degree of accuracy can be quickly transferred from the "reference roll" back into the grinding wheel . . . and then ground back into the "work roll" as shown above.

The machine is then ready for production grinding again without disturbing the set-up or removing anything from the machine. In this way the "work roll" can be re-processed whenever it loses form and can be used for hundreds of additional dressings, or until it is worn out. Duplicate crushing rolls can be ground in the same way on all Thompson Truform Grinders.


125 X 125 = 15,625
Dressings per master roll before Truforming
Added reprocessings per roll
Dressings per roll with Truforming on a thread form contour

What this means in savings is illustrated by the following example, involving a modified buttress thread form with an eight pitch form. Where two rolls are used in the Thompson Truform Process, it was possible to get *over 15,625 dressings* from the "work roll" before it was worn out. This meant an increase in continuous production (without changing or disturbing set-up) of 12,500%.

Write for the new 8-page Truform Leaflet—"Why didn't you tell me about this process before?"

Address Dept. 16

The Thompson Grinder Company • Springfield, Ohio

North East West South in Industry

C. R. HARMON has been appointed Pittsburgh District Sales Manager for **Firth Sterling Steel and Carbide Corp'n,** McKeesport, Pennsylvania. Previously, Mr. Harmon was sales manager for the Penn Carbide and Alloy Casting Co., and prior to that was with Jessop Steel Company, and the Crucible Steel Company of America.

NORTON COMPANY, Worcester, Mass., announces that **Dr. W. Irving Clark,** who retired recently as director of personnel, will continue in charge of the plant hospital; and, that **Harry E. Howard** has been named Mg'r of Personnel. Additionally, **George H. Powers** has been appointed Boron Carbide Eng'r with headquarters at the Worcester plant.

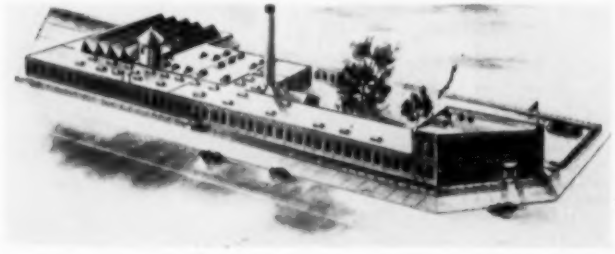
In the **NORTON GRINDING MACHINE** Div'n, **Everett M. Hicks** has been named Ass't Manager; and, in the Chicago Dis't of this division, **Oscar E. Nordstrom,** although retired from active duty as mg'r, will continue as consultant. **Robert D. Lawson,** formerly representative in northern New England, is now in charge as Dis't Mg'r in Chicago. The new representative for the Grinding Machine Div'n in the entire New England area, except for western Mass. and Conn., is **B. Harold Lewis.**

Appointment of **Dr. Laurence C. Hicks,** formerly Associate Director of Research in Charge of Magnetic Steel & Allied Products at **ALLEGHENY LUDLUM STEEL CORP'N,** to the position of Ass't Director of Research, has been announced. **John H. Crede** is the new Associate Director, succeeding Dr. Hicks. Other appointments announced by **Frank B. Lounsberry,** Vice-President & Technical Director, include **Claude M. Sheridan** to the post of Associated Director of Research in Charge of Stainless Steel & Allied Products; and **William J. Baldwin,** named Chief Plant Metallurgist at the company's Watervliet, N. Y., plant, succeeding **Ralph P. DeVries,** retired.

SHEFFIELD CORP'N, Dayton, Ohio, announces acquisition of the **Murchey Machine & Tool Company** of Detroit.

C. D. Reason, who recently acquired the business and physical assets of **SIEWEK TOOL DIV'N** of *Domestic Industries, Inc.*, Chicago, has established headquarters for Siewek Tool at 2862 E. Grand Blvd., Detroit.

Plant and offices (shown in photo) of the new **BRIDGEPORT PRESSED STEEL CORP'N,** Bridgeport, Connecticut—a consolidation of the **Bright Light Reflector Co., Inc.,** Bridgeport, Conn., and **International Appliance Corp'n,** New York City.



Manufacturing facilities, of **DETROIT REAMER & TOOL CO.,** Detroit, have been expanded to meet an increasing demand for their line of carbide tipped tools and high speed steel bodies. To provide a better and quicker service for these and other tools of their manufacture, the expansion program includes addition to office and factory space and the installation of new, up-to-date equipment.

Mid-America Exposition—a display of goods, made and used in the producing area bounded roughly by Detroit and Buffalo, Cincinnati and Pittsburgh—will be held at Cleveland Public Auditorium from May 22 through 31.

J. J. MELLON has been named Chief Engineer of **Allen-Bradley Co.,** Milwaukee, Wis., replacing **Gustav O. Wilms,** the latter to serve as an engineering consultant. Mr. Mellon has been associated with the company for two years, and previously was with Westinghouse Electric & Mfg Co., and Clark Controller Company in various capacities.

LOEWY CONSTRUCTION CO., INC., New York, has just received a 10 million dollar order for a Loewy Rolling Mill Installation to be erected in Sweden.

CARBORUNDUM COMPANY, Niagara Falls, N. Y., announces that **Fred J. Born** has been designated Sales Representative in the Dallas, Texas district, succeeding **William Crocker,** the latter having been transferred to the Houston area with headquarters in that city. Also announced by **Frank J. Tone, Jr.,** Vice-President and Gen'l Sales Mg'r, was the transfer of **James Darr,** formerly sales representative at Houston, to the St. Louis territory.

CARBOLOY COMPANY, INC., Detroit, has appointed the following new authorized distributors: **Silliter-Holden, Inc.,** 433 New Park Ave., Hartford 1, Conn.; **Kendall Hardware-Mill Supply Co.,** 225 W. Michigan Ave., Battle Creek, Mich.; and the **Rickert Industrial Supply Co.,** 616 W. Michigan St., Milwaukee 1, Wisconsin.

EDWARD R. ANDERSON has been named District Mg'r for California by **Hendey Machine Co.,** Torrington, Conn., with Los Angeles offices at Corporation Bldg., 724 South Spring St.; and the San Francisco address, Tilden Sales Bldg., 420 Market Street. Mr. Anderson was previously Hendey sales and service engineer in Chicago.

Stronger, Lighter Hand Truck Made by Welding Tubular High Carbon Steel

BY JAMES B. HOWLAND, PARTNER
TUBAR BENDING & MANUFACTURING CO., CLEVELAND, OHIO

THE new Tubar Hand Truck has outstanding strength and low weight because it is made of tubular high carbon steel with an exceptionally thin wall (.076"). Frame of the largest model Tubar weighs only 36 pounds, yet carries a 1,000-lb. load. Fig. 1 shows how light it is. The addition of reinforcing tubes from the kick-bar to the handle (see Fig. 3) makes a "stevedore" model with a 2,500-lb. capacity. Conventional hand trucks of these capacities weigh more than twice as much.

The all-welded tubular frame has other advantages in addition to lightness. Constructed without bolts or rivets, it has a smooth top and bed without obstructions. There is no danger from wood splinters or sharp edges of metal. Design of the frame distributes the load and reduces dead weight on the axle, facilitating handling. The operator's hands follow the curve of the handle in "breaking" the load to a pulling or pushing position. The Tubar Truck is patented.

Fig. 1. Demonstrating the lightness of the Tubar truck.

JIGS USED IN WELDING

We use two sizes of tubing—1 1/16" O.D. and 7/8" O.D. The smaller telescopes into the larger size at the maximum stress point, for greater strength. The tubes are bent on a bending machine (see Fig. 2). The toe plates are bevelled and forged to a point. Toe-plate sides are cut from 3/4" high carbon steel plate by an acetylene cutting machine. The frame parts are assembled in a jig and tack-welded, then finish-welded in another jig (see Fig. 3).

In setting up production, we had difficulty welding the high carbon tubing until we tried the new Lincoln "Shield-Arc LH-70" electrode, designed for high carbon and other difficult-to-weld steels. With "Shield-Arc LH-70" we are able to weld speedily without costly preheating or special welding procedures.

Engineers and designers may obtain Studies in Machine Design by writing THE LINCOLN ELECTRIC COMPANY, Dept. 413, Cleveland 1, Ohio.

Fig. 2. All bending is performed on a tube bending machine.

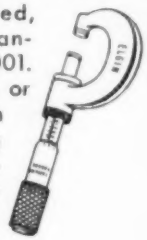
Fig. 3. Finish-welding a "stevedore" model. Jig rotates so most welding is in downhand position.

Advertisement

TOOL FOR PROFIT
WITH
ELGIN
Sapphire
WEAR RESISTANT

SAPPHIRE TIPT MICROMETERS

Precision engineered, light weight, guaranteed accuracy of .0001. Available in English or Metric. Tips remain flat even in grinding room usage. Outwearing steel in the plant of a drill manufacturer as much as 7000 times.



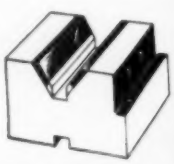
REFER D-10—SAPPHIRE SHORTS

WINDING GUIDES

Sapphire guides abrasive or coated wire, filaments or thread with minimum of wear to the guide and no abrading of wire surface. Variety of shapes. Hole sizes from .003 up. Outwears carbides consistently on every job.

REFER D-9—SAPPHIRE SHORTS

VEE BLOCK



Sapphire faced Vee blocks, gage anvils and wear surfaces provide a true non-wearing, non-magnetic contact area; non-corrosive. Design into your equipment to solve wear problems.

REFER D-13—SAPPHIRE SHORTS

WRITE FOR DETAILS AND
ENGINEERING ASSISTANCE
Sapphire
PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
AURORA • ILLINOIS

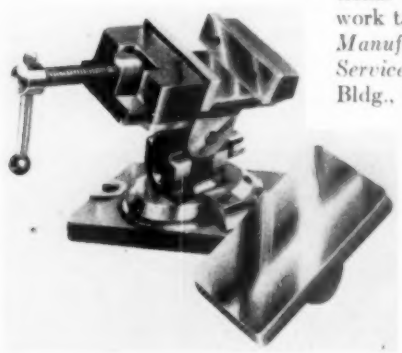
Drilling and Tapping Machine

WHILE DESIGNED primarily for drilling and tapping large copper anodes, an improved **HORIZONTAL DRILLING & TAPPING MACHINE,** by the *Cleveland Tapping Machine Co.*, Hartville, Ohio, incorporates features which make it applicable to a wide variety of long and irregular-shaped workpieces.

A hand control indexes the head for consecutively drilling and tapping, and the depth of hole and withdrawal of the tool are automatically controlled. A three-position indexing head can also be furnished to drill, countersink and tap the workpiece with one chucking. An air-operated vise for holding the workpiece (as shown in the illustration) is standard equipment. However, the air vise can be mounted on a special table, which functions as an air-operated cross-slide, thereby positioning the work so that it may be drilled and tapped at a number of predetermined points. A work rest may also be placed on the ways—or on brackets fastened to the end of the column—to provide additional support for long pieces. The machine is powered by a 1 h.p. reversing motor and will drill and tap holes up to ½" thread, in mild steel.

New Multi-Angle Vise

A NEW **MULTI-ANGLE VISE** that combines the additional feature of a tilting work table is announced by *Manufacturer's Engineering Service*, 419 Security Bank Bldg., Toledo 4, Ohio. The tool can be used as a plain, swivel or multi-angle vise and, with the interchangeable work table, as a general purpose bench tool. Fully described in an illustrated catalog.



"Let your Light so Shine"

This Free Lance Writer, Planner and Editor of long experience, member of ASTE, could prepare your Manual, Catalog or Promotional Specifications and probably save you time and money—your office or mine.

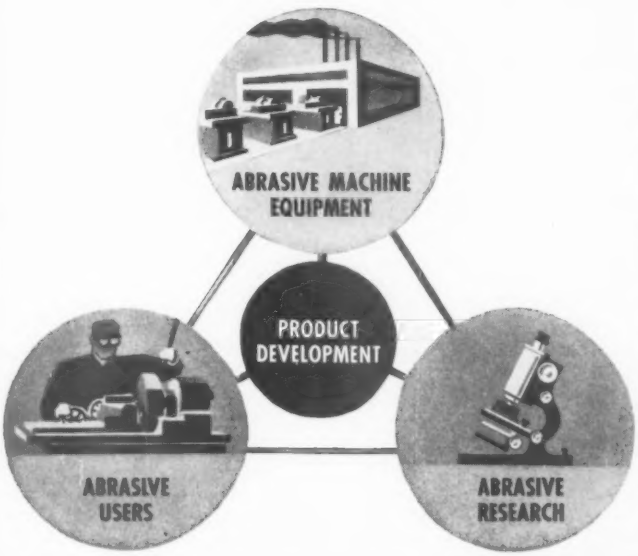
C. F. WORFOLK ALGONAC, MICH.

(Algonac is near Detroit)

A BUYING GUIDE FOR ABRASIVES

POINT No. 4

PRODUCT DEVELOPMENT



There is an important activity at The Carborundum Company concerned primarily with the interest and viewpoint of abrasive users. It is known as "Product Development."

Key step between research and abrasive user, its ten specialized divisions aim toward developing and applying the right abrasive in the right place. It closely relates abrasive machine builders, plant production personnel, and our own research. It evaluates products and techniques. It conducts rigid tests. Vital information is collected and interchanged. Hundreds of suggestions are carefully culled. Selection and application of abrasives thus continue to be made more effective. This is another reason for preferring products by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM

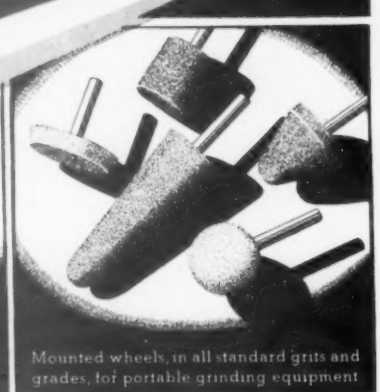
TRADE MARK

BONDED ABRASIVES

COATED ABRASIVES

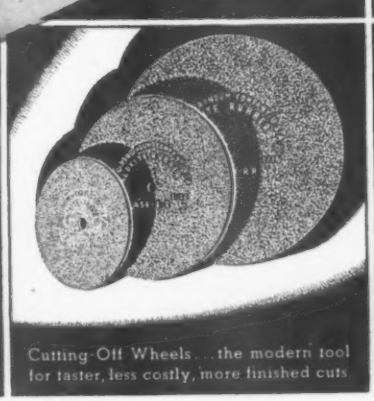
ABRASIVE GRAINS AND FINISHING COMPOUNDS

Tool Room sticks and stones that cut fast... last long... and hold their form.

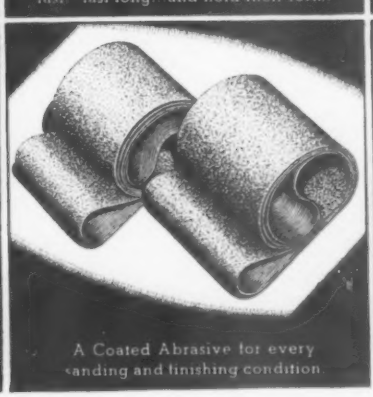


Mounted wheels, in all standard grits and grades, for portable grinding equipment

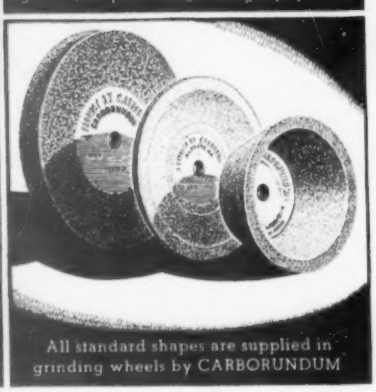
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Cutting-Off Wheels... the modern tool for faster, less costly, more finished cuts



A Coated Abrasive for every sanding and finishing condition



All standard shapes are supplied in grinding wheels by CARBORUNDUM

TAKE YOUR PICK

● Need tool steel? Midvale tool steel bars carried in wide assortment —all common grades and shapes warehouse-stocked—and ready for one-day shipment. Midvale's tool steel stocks include the Carbon, Oil Hardening, High Speed, Shock Resisting and Special Alloy Grades. Ask for Midvale's stock list. Gives you regular information about Midvale tool steels.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO

STAINLESS AND TOOL STEEL BARS
•
CORROSION AND HEAT RESISTING CASTINGS
•
FORGINGS AND RINGS

MIDVALE
Custom Steel Makers to Industry

Drilled • 50 minutes

Nibbled • 4 minutes or less

ODD, IRREGULAR SHAPES CUT FAST ON A CAMPBELL NIBBLING MACHINE

With a Campbell Nibbler you can cut—cleanly, quickly and cheaply—all kinds of shapes from sheet metal or composition. There is no distortion of material—no internal strain—no hidden fractures—no burr.

BRIDGEPORT, CONNECTICUT—The first use of this machine was for experimental and development work. But its use has gone far beyond that. In many plants, nibbling has become a standard method of cutting—the CAMPBELL NIBBLER a real production machine.

Its best use is where odd, irregularly shaped parts must be cut in quantities up to several hundreds and where the cost of a die would be prohibitive. As compared with drilling or filing, nibbling is from 40 to 60 times faster.

The CAMPBELL line of Nibbling Machines includes 7 models, the largest of which is shown here. They are described fully in a booklet which we will be glad to send you. Just ask for Booklet DH-593.

Send for this Booklet DH-593

ALSO MAKERS OF A COMPLETE LINE OF ABRASIVE CUTTING MACHINES

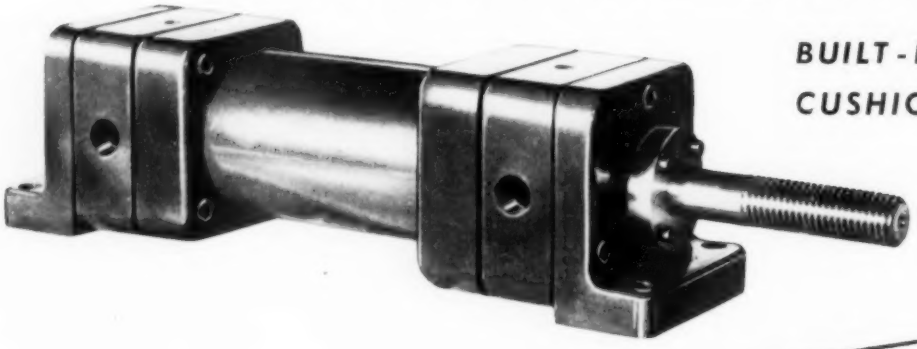
ACCO

TRADE MARK

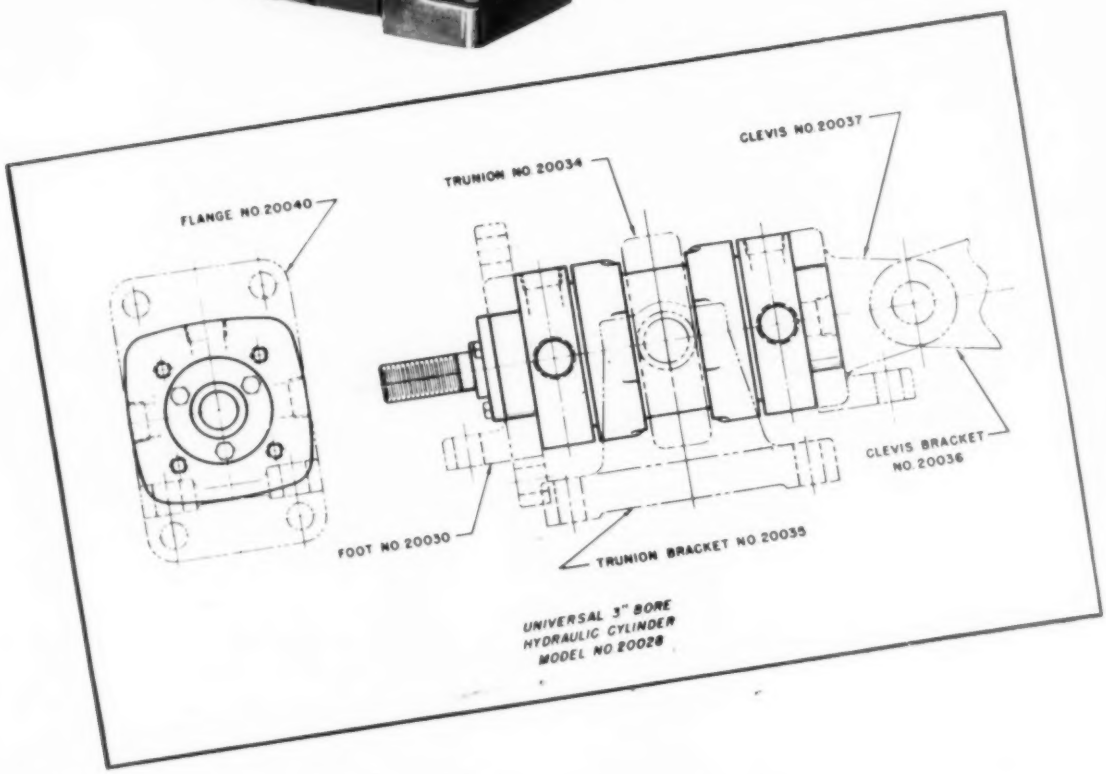
ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE • BRIDGEPORT, CONN.

Bristol Hydraulic Cylinders...

Unique 1500 P.S.I. Oil Hydraulic Cylinders feature NINE possible mountings from one basic cylinder . . .



BUILT-IN, SELF-ADJUSTING CUSHIONS AT BOTH ENDS!


CLEVIS NO 20037
TRUNION NO 20034
FLANGE NO 20040
CLEVIS BRACKET NO 20036
FOOT NO 20030
TRUNION BRACKET NO 20035
UNIVERSAL 3" BORE HYDRAULIC CYLINDER MODEL NO 20028

Flexible, versatile, and built to stand up under severe operating conditions, the new Bristol Hydraulic Cylinder is ideal for machine tool purposes! Its advantages are obvious . . . . with simple attachments, nine standard mountings are obtained from one basic cylinder. Built-in, self-adjusting cushions, at both ends, is another feature you've always wanted! And . . . automotive piston rings combined with "O" rings assure absolutely no leakage between cylinder chambers. Yes, when you have a tough job . . . beat it with a Bristol . . . Bristols are brutes for punishment!

Write Us Today for Prices . . .

BRISTOL MACHINE TOOL CO.

BRISTOL, PENNSYLVANIA

BESLY TAPS

SET NEW ECONOMY RECORDS FOR THE CHICAGO FAUCET CO.

In tapping faucet parts, Besly Acme Thread Taps outlast by more than a *three to one margin* any taps previously made or tested by The Chicago Faucet Company. Until Besly Acme Thread Taps were adopted for this operation, it was thought "impossible" to use a tap as long as thirty hours. Now, average tap life exceeds a hundred hours.

Operating with a Brown & Sharpe 2-G automatic, the basic problem was to clear chips on a three-pitch triple lead thread—at a spindle speed of 235 r.p.m. and a reverse speed of 2150 r.p.m. In co-operation with Chicago Faucet Company's engineers, Besly tap specialists helped to eliminate breakage—more than tripling the life of the taps.

Whether a "Special" or Standard Tap best fits your needs, there's a Besly Tap that will serve you better. Ask your distributor about Besly Taps and Besly Tap engineering service.

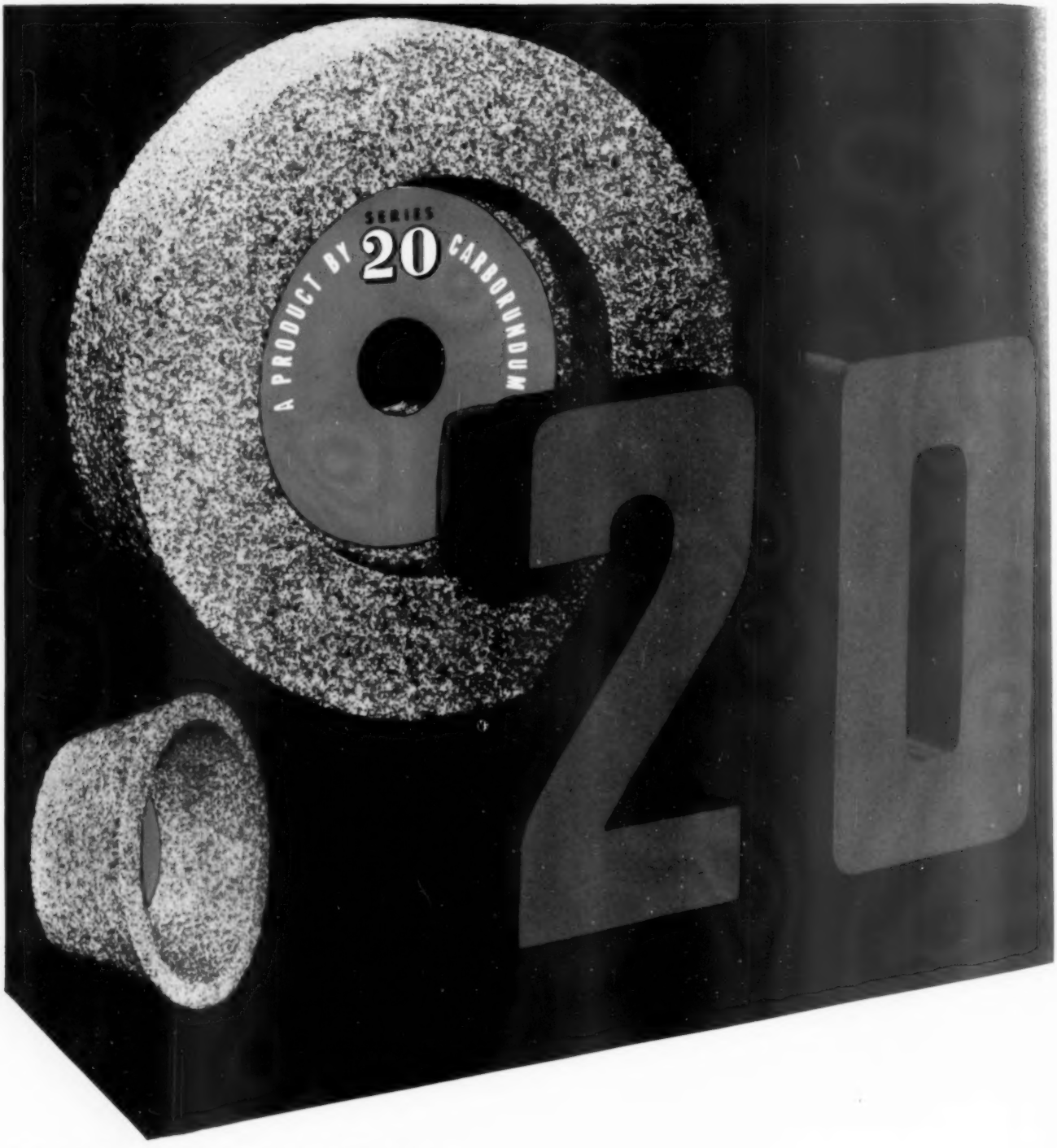
HELPFUL FACTS FOR TAP USERS

Ask for your free copy of this valuable Manual. It offers handy information on taps and tapping. Written by shop men for shop men. Listings include drill sizes and tap fits. *Write today on your letterhead for a copy.*

BESLY

BESLY TAPS • BESLY TITAN ABRASIVE WHEELS
BESLY GRINDERS AND ACCESSORIES

CHARLES H. BESLY AND COMPANY • 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

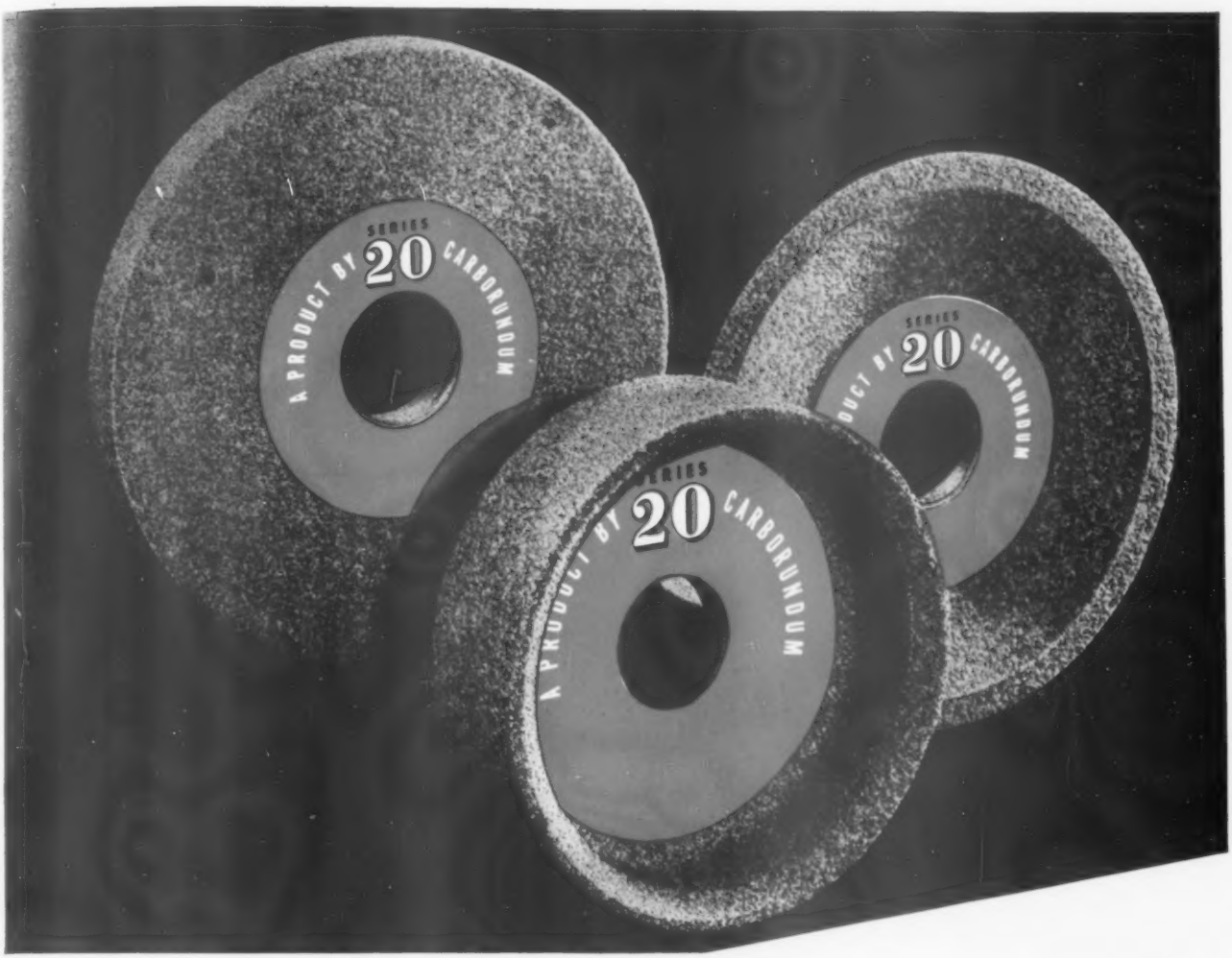


PRESENTING:

"SERIES 20" GRINDING WHEELS

An Important Development by the
leading name in Abrasives

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company



Setting new, higher standards of grinding while effecting production savings, "Series 20" is now ready for announcement. Of many important advantages, seven stand out. Briefly, they are:

1 Faster Stock Removal
2 Improved Tool Finishes
3 Fewer Damaged Tools . . . Less Scrap
4 Cooler Cutting Action
5 Longer Tool Life . . . between grinds
6 Increased Skill for Operators
7 Lower Wheel Inventory

As a development of the technical laboratories of The Carborundum Company, "Series 20" has exceeded all expectations. Tests have been conducted under a variety of conditions in a diverse list of factories. Especially for tool room use, "Series 20" represents one of the most progressive accomplishments of modern abrasive engineering.

In specifying "Series 20" for better grinding, the range of work classifications includes surface grinding, wet or dry operations, tool and cutter grinding and surface form grinding. A choice of standard sizes and shapes is available to meet the specific requirements of modern machine applications and grinding techniques. Yet, because "Series 20" covers a broad range of grinding, the actual needed inventory stocked can be smaller.

To be sure of the best grading for your specific grinding jobs, we suggest talking it over with one of our representatives. This is the best way we know to get started right on the use of "Series 20." In the meantime, to get a more complete story on "Series 20," send at once for our new booklet "Check List for Better Grinding." The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding . . . CALL IN

CARBORUNDUM

TRADE MARK

SPEED-WET* Belts & Discs for "RESIN BOND"

speed · cut · stamina

IMPROVED SPEED — dry-grinding with Speed-wet Resin-Bond Backstand Belts.

IMPROVED CUT — weld-grinding with Speed-wet Resin-Bond Fibre Discs.

IMPROVED STAMINA — wet-grinding with Speed-wet Resin-Bond Belts.

Resin-bonding increases the production rate, quality and total output of abrasive belts and discs by retarding loading-action and grain-shedding due to adhesive breakdown under the severe heat of cut.

Each individual abrasive grain in a Speed-wet Belt or Disc is twice anchored in a heat-set resin adhesive, which once cured and hardened cannot remelt or flow again under further exposure to heat or moisture.

Thus for dry or coolant grinding or for polishing and finishing of metals or glass or plastics, Speed-wet resin-bond abrasives deliver premium performance by any standard—production-speed, finish-quality or cost per unit.

Specify Speed-wet Metalite for aluminum oxide grit or Speed-wet Durite for silicon carbide. Metalite or Durite—they are both resin-bonded if they are marked "Speed-wet."

* *Reg. U. S. Pat. Off.*

BEHR-MANNING

(Division of Norton Company)

TROY, N. Y.

Here Is A Smooth, Sealed, Streamlined Spindle Package...

And Here's Why It Makes Your 6"x18" Surface Grinders Produce More Work And Finer Finishes

Look at the massive construction, the most Super-Precision Double Row Roller Bearings and oversize thrust bearings in this Spindle. You'll be quick to appreciate its ability to rough off surplus metal fast and produce finer final finishes.

The *sealed-in* motor delivers a full 1 HP at the wheel. It runs cool, at top efficiency, continuously. Dust, dirt, nuts, bolts and fingers are *sealed out.*

The *sealed-in* bearings likewise operate at top efficiency indefinitely. Lubrication is there to stay. You never have to oil or grease *this* spindle, and it won't run dry.

Put in one of these Spindles and let its performance speak for itself.

Data Sheet No. 12 gives you the story on application to *your* grinders. May we mail you a copy?

POPE MACHINERY CORPORATION
ESTABLISHED 1920
261 RIVER ST. • HAVERHILL, MASS.

No. 43

POPE Completely Sealed MOTORIZED SPINDLE

RACINE HYDRAULICS

Racine Variable Volume Oil Hydraulic Pump with solenoid operated 2-pressure control. These pumps supply the power for shearing, punching and trimming spring leaves that are fabricated by this press. Fifty foot bars are fed into one end of the press. A complete spring is fabricated on each cycle.

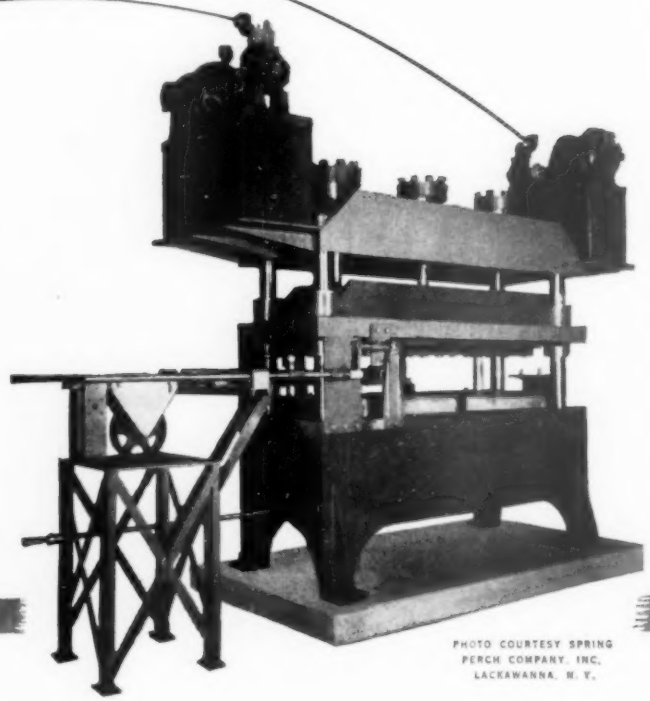


PHOTO COURTESY SPRING PERCH COMPANY, INC. LACKAWANNA, N. Y.

Smooth Oil-Cushioned Action Under Variable Volume Control

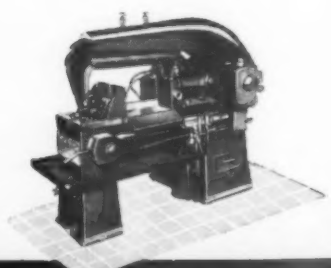
The built-in Variable Volume feature of RACINE Pumps simplifies your hydraulic circuits, reduces piping and eliminates the use of relief and by-pass valves. Your machine runs shock-free, cool and uses less horsepower. Aggregate cost of complete hydraulic assembly is substantially reduced.

RACINE users now include manufacturers of Presses, Die Casting and Plastic-Molding Machines, Drilling and Woodworking equipment, Lifts, Elevators and many additional types of machines. An impressive number have standardized on RACINE's full line of Variable Volume pumps, Sleeve Type valves and Hydraulic pressure boosters.

Let us prepare for you, a full outline of the special advantages your product can present when RACINE Hydraulic Equipment is used. Make our Variable Volume feature a part of your machine. RACINE hydraulic engineers will give you full cooperation without cost or obligation. Write today for our Free catalog P-10-C. RACINE TOOL AND MACHINE COMPANY, 1774 State St., Racine, Wisconsin.

Racine Hydraulic
METAL CUTTING MACHINES

Featuring open front design—simple one lever control—smooth oil-cushioned progressive feed. Cut any metal from light tubings to structural shapes and billets of tough tool steels. Models in all price ranges. Capacities 6" x 6" to 20" x 20". Write for complete catalog No. 12.



RACINE

STANDARD FOR QUALITY AND PRECISION

DID YOU KNOW . . . that a large percentage of economy in carbide tool applications is wasted in converting standard tools to shop requirements. The practical solution to high tool conversion costs is V-R "CUSTOMER STANDARDS." Write or call your nearest Vascoloy-Ramet Field Engineer for full information on your "CUSTOMER STANDARD" tools.

SEND for your copy of the NEW VR-400 Carbide Tool and Blank Catalog. 32 pages of vital carbide engineering data. Address Dept. TE-247.

The amazing growth of cemented carbides in the past decade has opened the way to tremendous production increases. Vascoloy-Ramet, manufacturers of V-R Tantalum/Tungsten carbides is foremost in the development of carbides in industry. In keeping with this tradition of leading industry in carbide tool performance, V-R now takes another significant step forward by introducing V-R "CUSTOMER STANDARDS." Studies reveal that most users alter standard carbide tools before putting them to work ...an entirely unwarranted cost! BECAUSE TODAY...V-R "CUSTOMER STANDARD" tools, made to your design, can be used without ANY alterations, available in any grade and quantity at prices, less in fact, than it costs you to alter your present standard tools to shop specifications.

MAKERS OF WORLD'S FINEST VR *Carbides*

VASCOLOY-RAMET CORPORATION NORTH CHICAGO ILLINOIS. U. S. A.

District Sales and Service in Principal Cities

AN AFFILIATE OF FANSTEEL METALLURGICAL CORPORATION AND VANADIUM ALLOYS STEEL COMPANY

SNYDER

designs and builds special-purpose machines for every type of metal-cutting operation

22 Years of Successful Cooperation with Leading American Industries

SNYDER TOOL & ENGINEERING COMPANY
3400 E. LAFAYETTE, DETROIT 7, MICHIGAN

SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION *AT LOW UNIT COST*

Production up 3 to 10 times

—report users of Improved TECO Cemented Carbide

- More pieces between grinds
- More grinds per tool
- Less down time
- Lower tool cost

ANOTHER TYPICAL CASE

Part: Diesel Engine Cylinder Liner
Material: Cast Iron
Machine: Lodge & Shipley Lathe
Operation: Turning O.D.
Diameter: 10½″
Length: Approximately 23″
Depth of cut: ¼″
Feed: .022″
Speed: 115 rpm
PIECES PER GRIND: 28 average
Best previous record: 1 to 8 pieces (average 5)
Note: For 5″ of the cut there are 23 interruptions per revolution

The impressive production records with Improved TECO Cemented Carbide, speak for themselves. The case described herewith is but one of many from plants that have increased production from 3 to 10 times over carbides formerly used. And what Improved TECO is doing for them, it can do for *you*. It is easy to find out.

Simply make this comparison! Replace present carbide tools with Improved TECO on any machine. Run under identical conditions. Then compare your pieces per grind—grinds per tool—tool life—tool cost. Check, too, TECO's exceptional ability to operate at higher speeds and feeds.

Consult one of our tool engineers, without obligation. If you prefer making your own run, send details of your set-up for proper recommendation. Write for latest catalog and price list.

TUNGSTEN ELECTRIC CORPORATION
570 39th STREET, UNION CITY, N. J.
Branch Office: 403 Western Reserve Bldg., Cleveland 13, Ohio
Representatives: Indianapolis, Ind., Detroit, Mich.

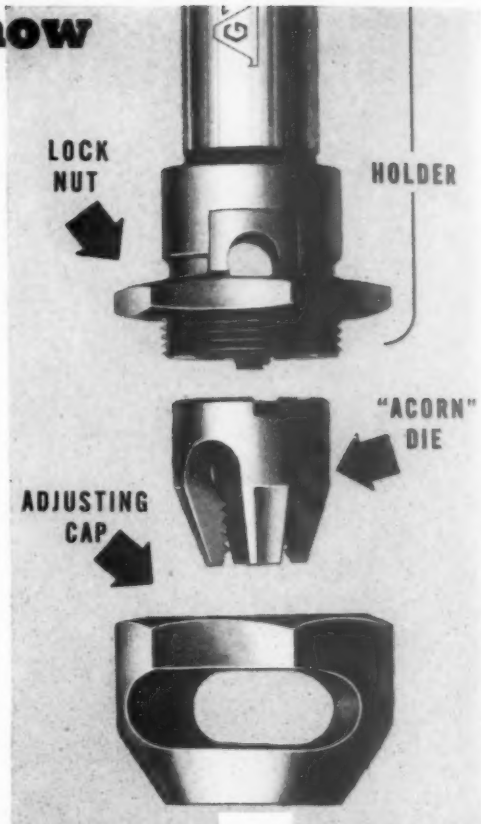
Improved
TECO
CEMENTED CARBIDE

A Few Facts You Should Know About "Acorn" Dies

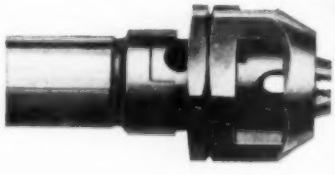
SIMPLE CONSTRUCTION • EASY TO OPERATE • FACTORY TESTED

To understand the operation of the "Acorn" Die, one should see it in relation to the "Acorn" Die Holder as pictured at the right in sectional view. The feature which makes the "Acorn" Die so convenient and accurate is the manner in which the four prongs or threaded lands are compressed when the holder cap is screwed down onto the holder. As all bearing surfaces on the holder and die are ground to insure correct alignment and accuracy, even pressure is brought to bear on each of the prongs simultaneously so that they all adjust equally and concentrically. This is done quickly and automatically by tightening the cap and turning up the lock nut. No other adjustments are necessary.

A positive adjustment to size can be obtained by using the threaded plug which comes with every "Acorn" Die. This plug has actually been threaded by the die in which it is shipped and has been carefully checked for accuracy. Thus, if it is used as a setting plug, accuracy of the set up will be assured. *For close to shoulder work, quick change over of jobs, accurate threads, specify "Acorn" Dies to your local Greenfield Distributor.*

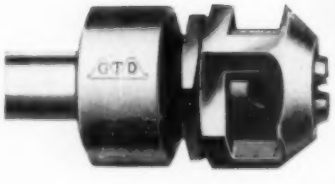


HOLDERS ADAPT "Acorn" Dies FOR ANY MACHINE



REGULAR

Regular "Acorn" Die Holder with longitudinal float which allows the die to follow its own lead independent of any lag in the machine. This holder may be used on practically all automatic screw machines and any other machines which provide for automatically reversing the die or rod at the instant when the desired length of thread has been cut.



RELEASING

Releasing "Acorn" Die Holder, while suitable for all machines, is especially recommended for hand operated machines. The improved clutch mechanism allows the holder to be released without shock.

ADAPTER

The "Acorn" Die Adapter permits the use of "Acorn" Dies with existing round die holders. It consists of three parts, a Cap to hold and adjust the die, a Lock-Nut to secure the adjustment and a Body. The shank fits round or spring die holders of corresponding size.

GTD Greenfield 75th YEAR

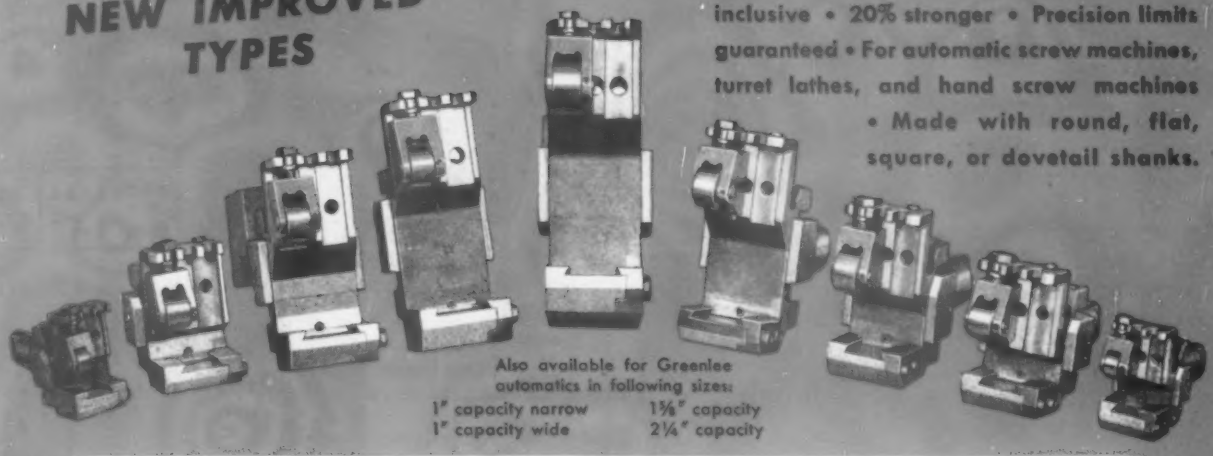
ASK YOUR "GREENFIELD" DISTRIBUTOR FOR 12 PAGE "ACORN" DIE BOOKLET!

GREENFIELD TAP and DIE CORPORATION • Greenfield • Massachusetts
and its New Haven Division The GEOMETRIC TOOL COMPANY

Slitters SHAVING TOOL HOLDERS

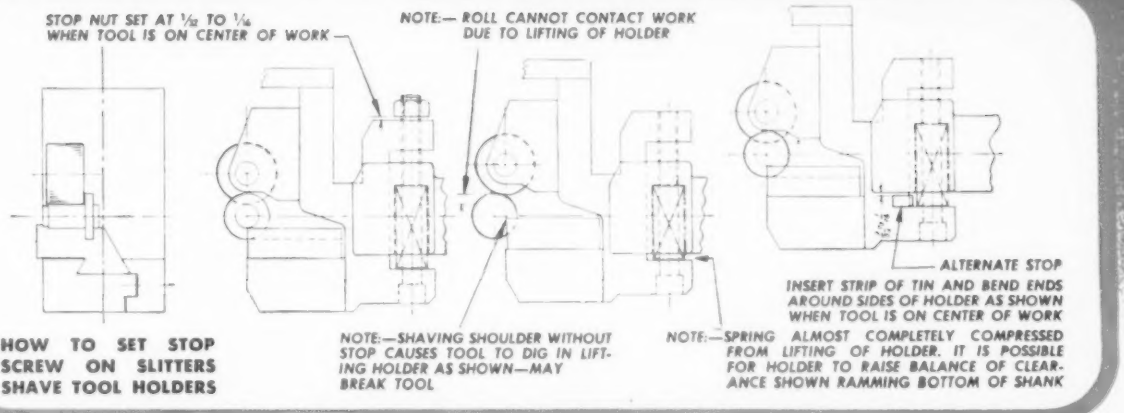
NEW IMPROVED TYPES

Loose jaw for easy tool removal and to take up variance in sizes • 13 sizes 7/16" to 5" inclusive • 20% stronger • Precision limits guaranteed • For automatic screw machines, turret lathes, and hand screw machines • Made with round, flat, square, or dovetail shanks.



Also available for Greenlee automatics in following sizes:

1" capacity narrow
1" capacity wide
1⅛" capacity
2¼" capacity


STOP NUT SET AT 1/32 TO 1/16 WHEN TOOL IS ON CENTER OF WORK
NOTE:— ROLL CANNOT CONTACT WORK DUE TO LIFTING OF HOLDER
ALTERNATE STOP
INSERT STRIP OF TIN AND BEND ENDS AROUND SIDES OF HOLDER AS SHOWN WHEN TOOL IS ON CENTER OF WORK
NOTE:—SHAVING SHOULDER WITHOUT STOP CAUSES TOOL TO DIG IN LIFTING HOLDER AS SHOWN—MAY BREAK TOOL
NOTE:—SPRING ALMOST COMPLETELY COMPRESSED FROM LIFTING OF HOLDER. IT IS POSSIBLE FOR HOLDER TO RAISE BALANCE OF CLEARANCE SHOWN RAMMING BOTTOM OF SHANK

HOW TO SET STOP SCREW ON SLITTERS SHAVE TOOL HOLDERS

FOR RESTRICTED CENTER DISTANCES

R4
RA4 7/8" and 1"—2nd Pos.

R4
RA4 7/8" and 1"—3rd Pos.

R6—9/16"
RA6—9/16" and 1" 3rd Pos.

R6—9/16"
RA6—9/16" and 1" 4th Pos.

ACME-GRIDLEY MULTIPLE SPINDLE BAR MACHINES

SCREW MACHINE TOOL COMPANY

17565 SWIFT AVENUE • DETROIT 3, MICHIGAN

MANUFACTURERS OF ACCESSORY TOOLS FOR ALL TYPES OF AUTOMATIC SCREW MACHINES

ONLY WHEN THE SHOE FITS

WHEN you bring your product or production engineering problems to Pioneer, you can be sure they'll receive thorough and competent study by our staff of production and engineering specialists. You can be sure, too, that their recommendations on materials, machines, tools, or systems are made *only* when they're sure "THE SHOE FITS." Their varied experience with other industry's problems frequently helps in solving your problem quicker.

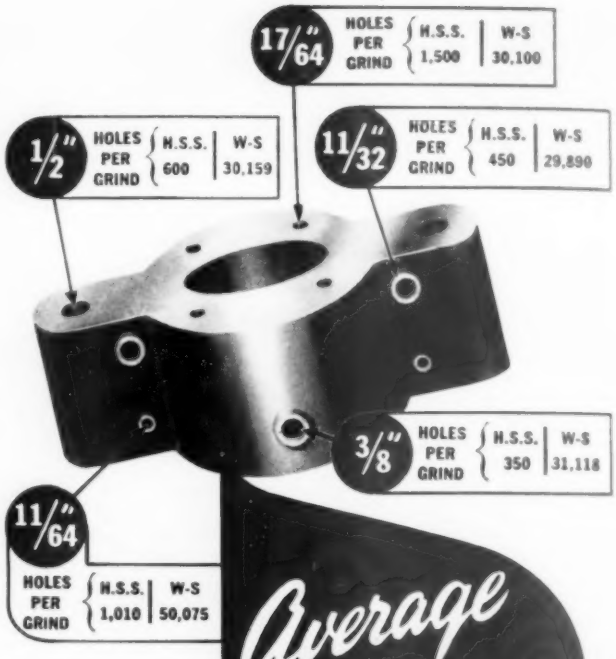
TO BECOME BETTER ACQUAINTED WITH OUR ORGANIZATION . . .

write (on your letterhead, please) for our booklet "The Answers to Industry's Problems," describing our complete service.

Pioneer Engineering and Manufacturing Company

19645 JOHN R ST., DETROIT 3, MICHIGAN

PIONEERing Better Production Methods and Tools


17/64 HOLES PER GRIND H.S.S. 1,500 W-S 30,100
1/2" HOLES PER GRIND H.S.S. 600 W-S 30,159
11/32" HOLES PER GRIND H.S.S. 450 W-S 29,890
3/8" HOLES PER GRIND H.S.S. 350 W-S 31,118
11/64" HOLES PER GRIND H.S.S. 1,010 W-S 50,075

Average 34,268 HOLES PER GRIND *with*

WENDT-SONIS CARBIDE TIPPED TWIST DRILLS

Records of drill performance kept by a large manufacturer producing cast iron parts, show how W-S Carbide Tipped Twist Drills average 43 times more holes between grinds. Comparisons were made on drilling operations in cast iron. Parts were drilled on multiple-spindle automatic machines. For faster, cleaner lower-cost drilling, try Wendt-Sonis Carbide Tipped Twist Drills in your work. These tools are recommended for drilling plastic and other non-metallic materials as well as non-ferrous metals. Get details in connection with your job requirements.

FREE New Catalog Sheets just off the press. Contain latest data, sizes, and prices. Most sizes IN STOCK. Write: WENDT-SONIS COMPANY, Hannibal, Missouri and 580 North Prairie Avenue, Hawthorne, California.

WENDT-SONIS

CARBIDE CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS
CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS
TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER
TURNING TOOLS • SPECIAL BITS

"We Save up to 30% of Production Time

WITH WALKER-TURNER DRILL HEADS IN SPECIAL JIGS"... *Wright Aeronautical Corp.*

"To eliminate costly setup time, a number of small individual jig-drill combinations employing Walker-Turner standard drill units costing $100 to $400 have been installed.

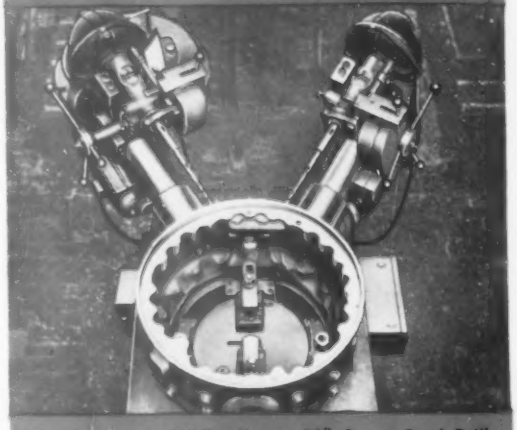
"Housing sections of the Wright Cyclone engine require hundreds of holes of various depths, diameters and angles. With this installation the changing of jigs and fixtures becomes unnecessary.

"PRODUCTION SCHEDULES ALLOWED AS MUCH AS 30% OF TOTAL OPERATION TIME FOR THIS SETUP PROCEDURE. This new method eliminates setup and the possibility of error is reduced.

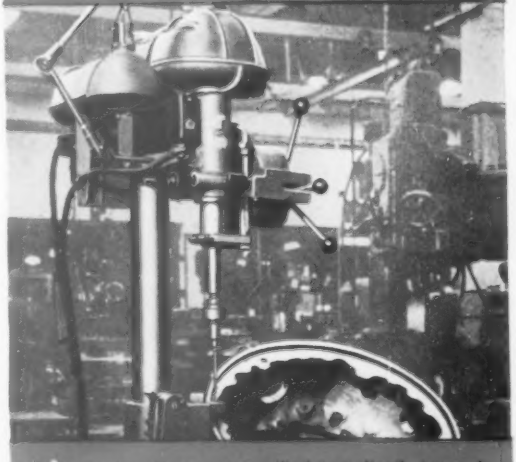
"We now have more than 30 special jig-drill setups employing Walker-Turner Drill Heads in this plant all working to our complete satisfaction."

E. PRANGE, *Supervisor*
Process Engineering
Wright Aeronautical Corp.

Operating on the bottom of the workpiece, two Walker-Turner 20" Power Feed Drill Presses are used in this installation.



By placing two Walker-Turner 20" Power Feed Drill Heads in a horizontal position, loading of the cumbersome workpiece is greatly facilitated.



Two angular oil passages drilled into distributor pads with Walker-Turner 20" Power Feed Drill heads.

TWENTY-FIFTH YEAR
1922 1947

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS 168

walker-Turner
COMPANY, Inc.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

BAY STATE
TAPS and DIES

PRECISION
EFFICIENCY
ECONOMY

On nearby shelves of Industrial Supply Distributors.

BAY STATE TAP & DIE CO.
MANSFIELD, MASS.

Free YOURSELF FROM MISALIGNMENT TROUBLES!

Types to fit any machine used for tapping or reaming.

Misalignment troubles in tapping and reaming will quickly disappear if you use a Ziegler Floating Tool Holder—the holder that automatically compensates for inaccuracies up to $\frac{1}{32}$" radius or $\frac{1}{16}$" diameter.

The Ziegler Holder always floats freely, without friction or cramping, even under the severest tool-driving strains, and takes any and all end-thrusts. This is why it eliminates spoilage losses, turning out work accurately to the finest of tolerances.

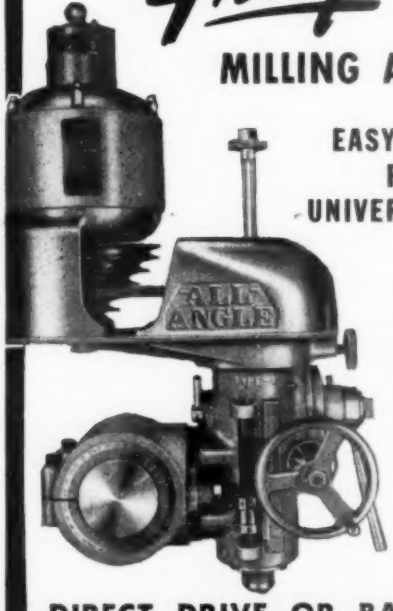
Naturally, the Ziegler Holder also greatly shortens set-up time, because of the fact that the set-up does not have to be made so accurately. Try it and see!

W. M. ZIEGLER TOOL CO. 1930 Twelfth St., Detroit 16, Mich.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE **FLOATING HOLDER** *for* **Taps** *and* **Reamers...**

Fray "ALL-ANGLE" MILLING ATTACHMENT



EASY TO HANDLE
FLEXIBLE
UNIVERSAL • STURDY

It is an all purpose attachment which has thoroughly proved itself all over the world. Ideal for the making of plastic molds, die casting molds, permanent mold casting molds, metal patterns, tool and die making, production work of all kinds, as well as for grinding, drilling, boring, etc.

DIRECT DRIVE OR BACK GEARED
8 SPINDLE SPEEDS 125 TO 5200
For further information write Dept. H

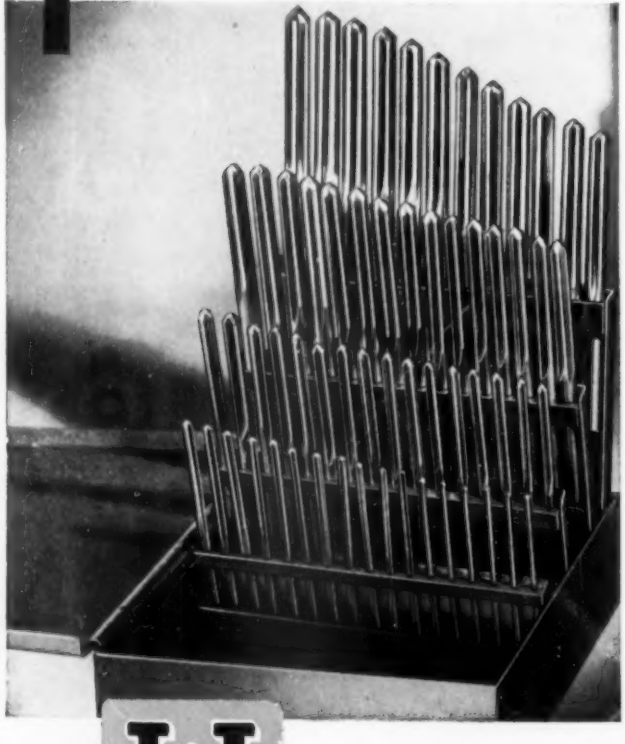
NATIONAL DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE 4, R. I.
AGENTS IN ALL PRINCIPAL CITIES

Are You Using Norton
OPEN STRUCTURE
Grinding Wheels?
Their Fast, Cool Grinding Action Can Cut Costs on Many Jobs . . .
IF you have jobs where stock removal is heavy, where contact is broad or where extra coolness of cut is essential, it will pay you to try Norton OPEN STRUCTURE grinding wheels.
They are available in the several varieties of Alundum abrasive; also in Crystolon abrasive for grinding carbide tools. The combination of OPEN STRUCTURE and the new 32 ALUNDUM* abrasive is showing truly remarkable results in many plants.
Let a Norton abrasive engineer study your grinding jobs and specify OPEN STRUCTURE where it can save you time and money.
NORTON COMPANY
Worcester 6, Mass.
Distributors in All Principal Cities
*Trade Mark Reg. U. S. Pat. Off.
W-1111
Available in ALL
NORTON ABRASIVES
Including the Sensational
New 32 ALUNDUM*
NORTON ABRASIVES
ABRASIVES - GRINDING WHEELS - GRINDING AND LAPPING MACHINES - REFRACTORIES - POROUS MEDIUMS - NON-SLIP FLOORS - NORBIDE PRODUCTS - LABELING MACHINES

Specialists

It takes many people and many things to keep an unvarying accent on the accurate dimension control, fine finish and super-hardness inherent in L & I Ground Flute Reamers. Strict adherence to a singularly high purpose such as this places these Wire Gage Sizes in a class apart. Available in complete sets or individual sizes. Your advantage . . . eliminating the delay and added cost of ordering specials.

• There are sixty-nine in-between-sizes of L & I Wire Gage Reamers — from 5/16 down to .040.



L & I

Reamers GROUND FROM THE SOLID

LAVALLEE and IDE, Inc.
CHICOPEE • MASSACHUSETTS

Merz Pneumatic Taper Gages

Check taper and out-of-round in single operation

MERZ Pneumatic Taper Gages perform both these vital inspection functions in *one* operation. MERZ Taper Gages—in models to fit all your inspection requirements—consist of two MERZ Air Gages, plus a special fixture equipped with large and small hard steel taper-gaging rings. One air gage registers taper variations to plus or minus 30′, in graduations of 5′. (Also available for totals of plus or minus 10′ in graduations of 1′). Out-of-round conditions up to .002 are registered simultaneously on the second gage in increments of .0001. MERZ Pneumatic Taper Gages are fast, accurate, durable and dependable. Write for complete information.

MERZ also manufactures a standard line of pneumatic gages in five models, as well as standard A.G.D. and special gages.

MERZ Engineering Company
INDIANAPOLIS 7, INDIANA

FLOOR SPACE: 16 SQUARE FEET

Announcing the 3-U SPEED-FLEX AUTOMATIC TURRET LATHE

the latest Potter & Johnston development

I It has the necessary power and high speed demanded by carbide tooling, plus required rigidity and strength.

II Speed and efficiency of machine reduces cost per piece, despite greatly increased hourly pay of operator.

III Electro-pneumatic speed control; split second timing on change from rapid traverse to working speed and vice versa.

IV Versatility of tooling. Six turret faces are provided for the mounting of tools; turret is of liberal dimensions.

V Minimum floor space (16 sq. feet) in relation to capacity of machine. This economy is important in planning the production line.

POTTER & JOHNSTON MACHINE COMPANY

PAWTUCKET, RHODE ISLAND

In Wright Cyclone Aircraft Engines, Ampco Extruded Bronze is specified for bushings, fuel injection nozzle inserts, and other parts — for its efficiency at extreme temperatures, its corrosion resistance, and its strength-weight ratio.

Flyin' high — and lasting longer because they're Ampco extruded bronze

. . . wear-resistant aircraft parts cost less when machined from Ampco extruded stock

Exceptionally high strength-to-weight ratio is an indispensable asset for aircraft parts. This quality is one of seven outstanding performance advantages of Ampco aluminum bronzes — advantages which give *better* and *longer* service for vital parts subject to wear in any application.

Extra economies are afforded when you can use Ampco extruded bronze rods. Extruded stock provides sizes close to most requirements—reducing waste and machining time; the smooth finish and compact structure cuts down rejects caused by physical flaws.

Two grades of Ampco Metal and two grades of Ampcoloy (industrial bronzes) are regularly produced in extruded form by Ampco. Rods in a complete range of sizes are available for immediate shipment.

Write for Bulletin 64A.

Ampco Metal, Inc., Department TE-5
Milwaukee 4, Wisconsin
Field Offices in Principal Cities

Ampco Metal gives these 7 outstanding performance advantages:

Resistance to — Corrosion • Compression • Impact • Fatigue • Wear — Excellent bearing qualities • Efficiency in extreme temperatures.

AMPCO Metal
The Metal without an Equal

AD-28

INGERSOLL *Shear Clear*

Carbide Tipped **FACE MILLS FOR HIGHER FEED RATES MILLING**

• Iron • Aluminum • Steel

The Ingersoll patented Shear Clear face mill is now available with special angles for milling either cast iron, aluminum, or even steel with carbide tipped blades. It is now possible to mill steel with positive angles using carbides if there is sufficient rigidity in machine and fixture.

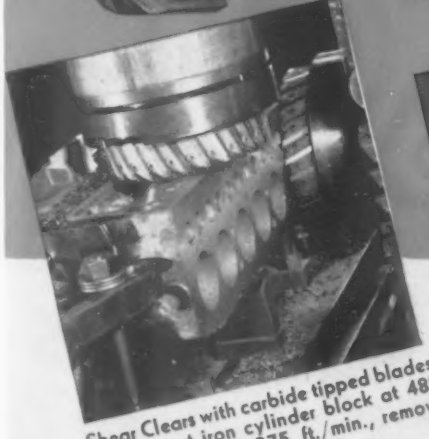
Carbide cast iron Shear Clears are now milling cylinder blocks, crank cases, transmission cases, flat irons, etc., at feed rates up to 48" per minute, and special cutters can be designed for higher feed rates if power is available.

Feed rates and cutting speed are almost unlimited with Ingersoll carbide tipped Shear Clears milling aluminum. Machine rather than cutter is limiting factor.

The steel carbide Shear Clear is particularly intended for rough and finish cuts on steel weldments. The unique combination of cutting angles controls chip flow and protects entering angle to maintain cutting edges on carbide tip.

Write for Catalog No. "55C" describing these and other Ingersoll inserted blade milling cutters with high speed steel, cast alloy, or carbide tipped blades.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS



Shear Clears with carbide tipped blades milling cast iron cylinder block at 48" per minute feed, 275 ft./min., removing 1/8–3/16" stock.

Note how Shear Clear chip is forced to coil out along the blade away from finished surface and is thrown clear of cutter at end of cut. This action produces smoother finish, faster feeds, longer tool life, and less power requirements.

Milling SAE 2330 test block with 10" diameter Carbide tipped Shear Clear. 3/4" stock, 8" wide cut, 300 ft/min., 16" feed, 105 horsepower.

Can you answer these

7 QUESTIONS

on Automatic Internal Grinding?

READ THE QUESTIONS CAREFULLY—and see how many you can get without looking.

We'll give you a hint to start with. Automatic grinding goes back quite a few years. It's older than you probably think. But with that, you're on your own.

If you get three out of seven, you've scored a fair average. Get five out of seven and you rate among the experts in machine tools. If you can answer all seven questions correctly, you're either phenomenal—or an old Heald employe.

And if there is any question you'd like to ask about automatic internal grinding—how to put it to work on your own production line, for instance—the chances are we have the answer. Write: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

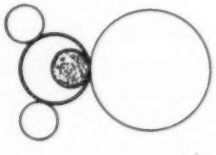
1. When did the first Heald internal grinder with a completely automatic grinding cycle appear?

2. What was the first automatic internal that would grind without gage plugs or any connection with the work?

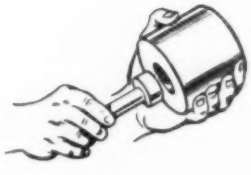
3. Why was the Heald No. 81 Centerless Internal such a revolutionary development in automatic grinding?

4. How many grinding machines can one operator handle—(1) (2 or 3) (4 to 6)?

Below, the completely automatic Heald No. 81 Centerless Internal Grinding Machine, for mass production of parts up to 4½" O.D. x 3" long. Automatic sizing is also available on Heald Internals for medium and large-size grinding operations.

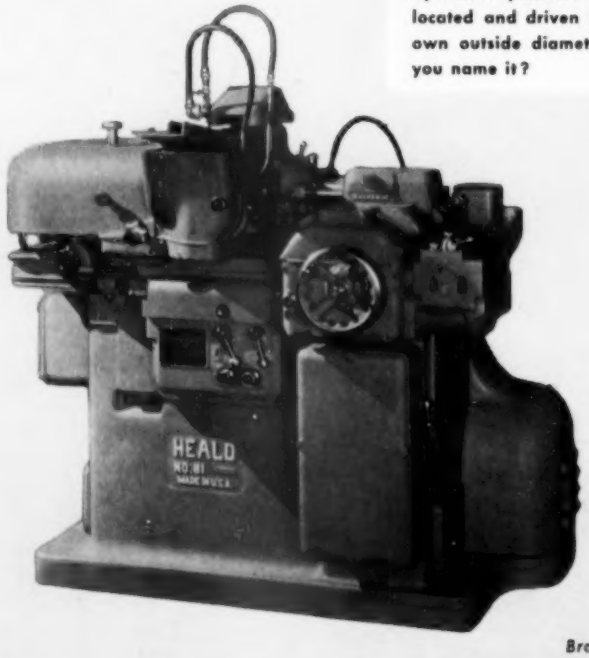


5. The diagram shows a method of internal grinding by which cylindrical work is located and driven from its own outside diameter. Can you name it?



6. Can you name the two most accurate methods of automatic sizing in internal grinding?

7. Where would you be most likely to get the newest developments in automatic grinding, along with the service and experience that goes with them?



ANSWERS: **1.** 1925. It was the Heald Electric Indicator Internal. **2.** The Heald No. 72 Size-Matic Internal, introduced in 1926 • **3.** Because it was completely automatic in operation—with automatic loading, automatic size control, automatic cycles, and automatic ejection • **4.** When the machines are Heald No. 81 Centerless models, one operator—and a semi-skilled one at that—can run from 4 to 6 • **5.** Heald Centerless Grinding, in which three rolls replace the conventional chuck • **6.** Heald Size-Matic ("automatic brain") and Heald Gage-Matic (solid plug gaging) size controls. **7.** From Heald, of course—who else?

HEALD

means more precision
. . . less cost

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

IMPROVE CUTTING *Efficiency* BY USING CARBIDE-TIPPED TOOLS *with* HIGH-SPEED STEEL BODIES

Taper Shank Chamfering Cutter with Carbide Tips.

Subland Reamer and Form Relieved Counterbore with Carbide Tips.

Straight Shank Form Relieved Cutter with Carbide Tips.

The perfection of Carbide-Tipped Tools Brazed on Hardened High-Speed Steel Bodies marks an epoch in the creation of tools of higher cutting efficiency. Here are the reasons:

The high-speed steel body naturally provides a much harder base for the carbide tips, thereby greatly reducing "spring-back" under heavy cuts.

Then too, the flutes and pilots, because they Rockwell C-62-63 throughout their entire length, do not score or pick-up, the pilot giving much longer wear.

The result is that Carbide-Tipped Cutting Tools with HIGH-SPEED STEEL BODIES give you smoother operation, longer tool life and reduced production costs. You get not only top-quality tools but also top-quality work.

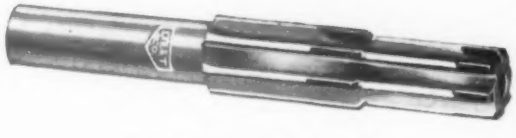
Our engineers will be glad to work with you on your problems.

• MADE TO YOUR SPECIFICATIONS •

DETROIT REAMER & TOOL CO.

2830 E. Seven Mile Road **Detroit 12, Michigan**

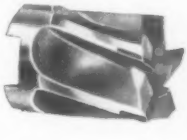
Manufacturers of Oil-Hole Drills, Subland Drills, Special Reamers, Circularity Relieved Reamers, End Mills and Special Tools



Step Reamer with Carbide Tips.

Write for QUOTATION

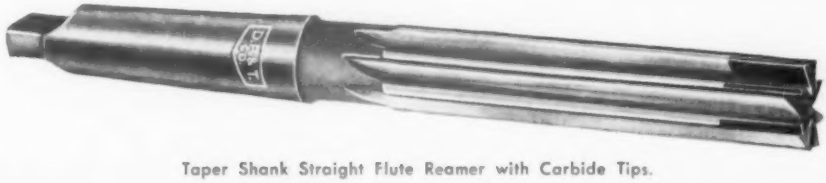
SUBLAND REAMERS
•
LINE REAMERS
•
CENTER DRILLS
•
COUNTERBORES
•
CORE DRILLS
•
END MILLS
•
Special Tools To Your Specifications



Spiral Shell End Mill with Carbide Tips.

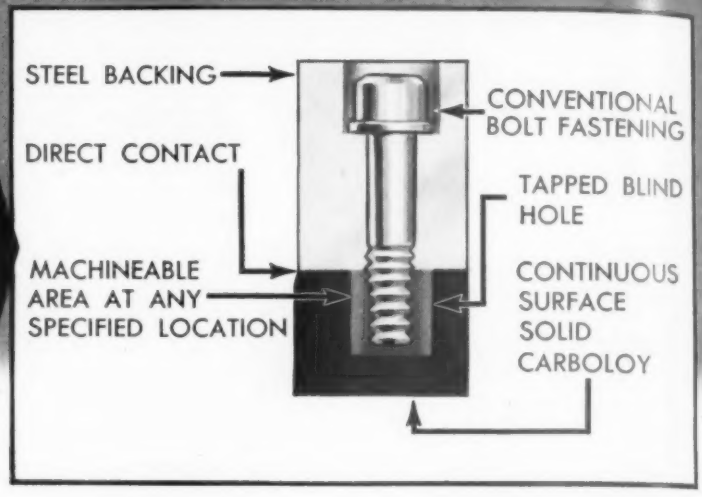
Straight Flute Shell End Mill with Carbide Tips.

Taper Shank Core Drill with Carbide Tips.



Taper Shank Straight Flute Reamer with Carbide Tips.

NOW! ATTACH CARBOLOY* WHEREVER YOU NEED IT WITH BOLTS!



New Mounting Method Provides Uninterrupted Carboloy Surfaces by Bolting to Tapped Blind-Holes

New—exclusive . . . this Carboloy-developed mounting-method tremendously widens cemented carbide's range of usefulness!

Carboloy Cemented Carbide sections are supplied to your specifications, already equipped with machineable inserts which may be drilled and tapped for bolting into place. Very large sections of carbide can now be easily mounted where needed. By blind-tapping, "through holes" are eliminated, giving continuous uninterrupted surfaces.

CARBOLOY PUNCH AND DIE SET shown here illustrates how studs are used to attach carbide to mounting. This gives a solid steel backing for the carbide punch, greatly increasing its ability to resist shock.

5-STAGE CARBOLOY PROGRESSIVE LAMINATION DIE, in which the female members for the first, second and third stages are attached to the steel die block by the new method. Points of attachment are indicated by lighter-toned spots above stud locations. The large carbide punch for the first stage and the two punches for the third stage are also attached by this method. All working parts of this die set are of Carboloy Cemented Carbide, including dies, punches and guide and locating pins.

Direct contact of carbide with back-up metal increases impact resistance. Users can specify desired locations of attachment points, and drill and tap inserts in their own shop.

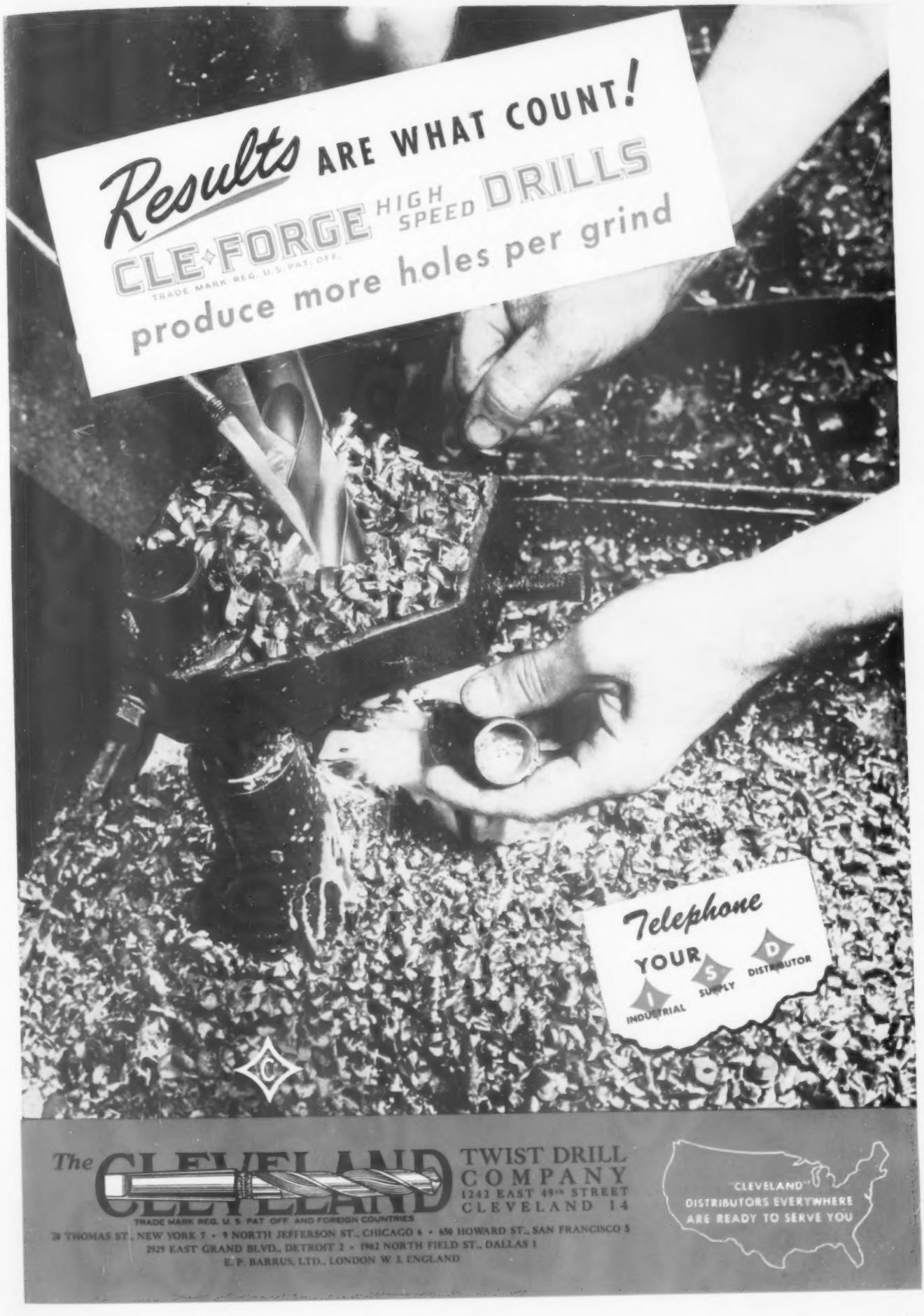
Typical of the range of applications are: Wear parts on fixtures, machine ways, guides, work rests and shoes, compound, progressive and segmental dies, crank guides, cam liners, punches, wear plates, and many others. For further details, write: Carboloy Company, Inc., 11139 E. 8 Mile Ave., Detroit 32, Michigan.

CARBOLOY CO. INC.

11101 E. Eight Mile Ave. Detroit 32, Mich.

*CARBOLOY (TRADEMARK) CEMENTED CARBIDE

SHEET METAL DRAWING AND BLANKING DIES


Results ARE WHAT COUNT!
CLE-FORGE HIGH SPEED DRILLS
TRADE MARK REG. U.S. PAT. OFF.
produce more holes per grind
Telephone
YOUR
INDUSTRIAL
SUPPLY
DISTRIBUTOR
The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND 14
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES
70 THOMAS ST., NEW YORK 7 • 9 NORTH JEFFERSON ST., CHICAGO 6 • 650 HOWARD ST., SAN FRANCISCO 5
2929 EAST GRAND BLVD., DETROIT 2 • 1902 NORTH FIELD ST., DALLAS 1
E. P. BARRUS, LTD., LONDON W. 3, ENGLAND
"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

TAPPING TIPS

From Woody Spencer's Notebook

TAKIN' TOO BIG BITES ALWAYS GETS YOU IN TROUBLE

You know how kids are, always in a hurry, always stuffin' in their food, fast as they can, so they can get going again. You know the stummick aches that usually follow too. Well, my wife keeps tellin' our kids to eat slower and take smaller bites and the other day at dinner it got me to thinkin' too. You know how I can't keep my mind off of taps and I started thinkin' about sharpenin' taps and how much trouble big bites get you into. Take too big a bite when regrinding and you burn the threads, dull 'em and likely ruin the tap. Take little bites, more of 'em, and you come out with keen, sharp taps that turn out beautiful work. So I thinks, "I'll tell the boys so's they'll remember when sharpenin' taps, always take little bites."

Woody Spencer's Tapping Tips aren't intended to be engineering advice on tapping problems. They're just the results of a lot of experience and some ideas gathered from the boys in the shops and if they make a few tapping jobs run smoother and quicker, we think they're well worth while.

The real tapping problems that call for trained engineering and technical advice are something else. When you run into them, let our engineers help you. Send us complete information on the job—material, diameter of hole, depth of thread, whether it's through or blind, type of tap, lubricant used and all the information you think we should have. Our tap engineers will be glad to give you definite technical suggestions concerning your problems. No obligation, of course.

NOTE: Woody Spencer's Tapping Tips will appear here as often as Woody gets time to write them up. Look for them.

Woody Spencer's Handy Tap guide is packed with useful information on tapping. It's free. Write for your copy on the Company letterhead.

THE RIGHT TAP AT THE RIGHT TIME

The Wood & Spencer Company

Cleveland 3, Ohio

GAMMONS REAMERS★

Originators and Manufacturers of Helical Reamers and End Mills

Helical Taper Pin Reamers Shipped by Return Mail

The

GAMMONS-HOAGLUND *Company*

400 MAIN STREET, MANCHESTER, CONN.

Ledeen

HEAVY DUTY CYLINDERS

The cylinder that does the "TOUGH" jobs more easily!

Whenever you have to... push or pull, lift or lower, press or squeeze, tilt or turn, open or close, use Ledeen Heavy Duty Cylinders.

SEND FOR BULLETIN 453

ENGINEERING PRODUCTS CO.

LEDEEN MANUFACTURING DIVISION

1600 S. SAN PEDRO ST. • PRospect 7044 • LOS ANGELES 15, CALIF.

SIMONDS Red Tang FILES

. . they keep your File-Costs down

RED TANG FILES have the same basic tooth-design as Simonds Metal-Cutting Saws. So Red Tangs *cut,* instead of *scrape* . . . remove more metal with less elbow-grease. That's why workers like them. *And here's why YOU will like them:* They last longer . . . and deliver more and better work per file-dollar. Order Simonds Red Tang Files from your Industrial Supply Distributor, or from the nearest Simonds office listed below.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Avenue, Spokane 8, Washington; *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS — Special Electric Furnace Steels
SIMONDS ABRASIVE CO. — Grinding Wheels and Grains
SIMONDS — Simonds Products for Canada

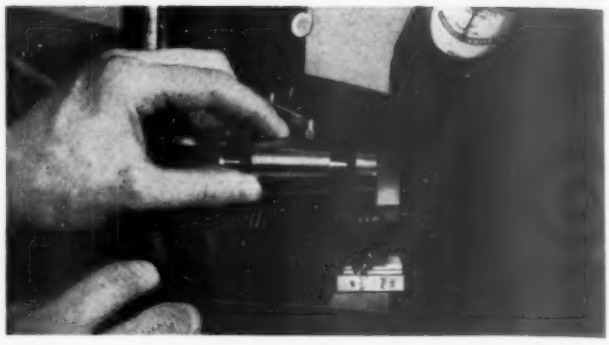
DRILL JIG BUSHINGS

Accurate
Interchangeable
Concentric

Acme
Industrial
Company

WRITE FOR FREE CATALOG

200 N. LAFLIN STREET, CHICAGO 7, ILLINOIS



a ten-thousandth is routine . . . where JO-BLOCKS control by *millionths!*

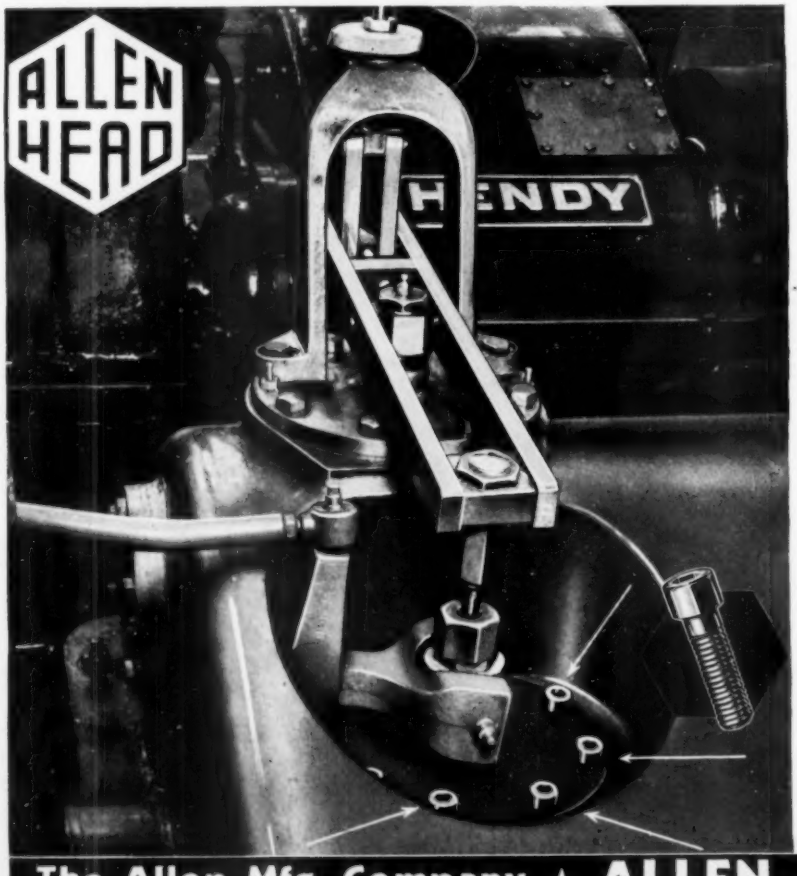
It PAYS to control parts-dimensions to close limits. It pays in ease of assembly, in product performance and in the assured fit of replacement parts. In wartime, it paid richly in human lives saved. JO-BLOCKS, the pioneer precision controls, produced in America by Ford Motor Company only, for all industry, are warranted accurate to ± .000002", .000004" or .000008", and are available in sets or as individual blocks, of inch or metric measurement, with various accessories. With properly selected genuine Jo-Block equipment, accuracy control can be maintained to the highest practical degree over the working gages required for any mechanical dimensional inspection. Write for latest illustrated literature.

FORD MOTOR COMPANY • JOHANSSON DIVISION
3614 Schaefer Rd. Dearborn, Mich.

Ford

Johansson

GAGE BLOCKS



ALLEN

SOCKET HEAD CAP SCREWS

— as used in the governor assembly of turbo-generator set, 500-kw. unit built by Joshua HENDY Iron Works, Sunnyvale, Calif.

In the governor mechanism, in a special sense, the *controlling* factor is integrity of the assembly and DEPENDABILITY of its components. In this place of responsibility are ALLEN Socket Head Cap Screws, — and in *other* important places in the power unit.

"Allens" have the HOLDING-POWER because they have the strength for powerful set-ups. Their strength is gained by *"pressur-forming"* of special-analysis *ALLENOY* steel, which makes the steel fibres conform to the shape of the screw head. In the perfectly-formed hex sockets, the keys bear evenly and equally on all surfaces. Threads also are *"pressur-formd"* to a high Class 3 fit, for high-friction hold in tapped hole.

Order of your local Industrial Distributor.

The Allen Mfg. Company ★ ALLEN ★ Hartford, Conn., U. S. A.

Staples Tool Engineers look in . . .

*UNEXPECTED PLACES!

To help you SAVE on Tool Costs and AVOID Production Lags

*Unexpected Places

often are routine, high production hole cutting operations, where high tool costs are accepted as *normal* (by the manufacturer) for the work produced. Here is a typical—and actual—example:

A prominent automotive manufacturer, using H.S.S. reamers for finishing close tolerance holes in cylinder blocks, found this operation lagging far behind in production. Due to the material being reamed, the tools became dull after running two to three hours, causing frequent down time for changing tools. Overtime did not eliminate the bottleneck, and a second machine was ordered for this operation.

Staples Tool Engineers recommended a trial using special Staples Carboloy-tipped Reamers. As a result, the operation is now run continuously for *four days* without a shut-down for tool resharpening—and the required work output is maintained without the addition of a second machine.

Tools that produce savings such as these are worth a trial in *your* production. Call in a Staples Tool Engineer for an on-the-job demonstration. There is no obligation.

THE STAPLES TOOL COMPANY
CINCINNATI 25 OHIO

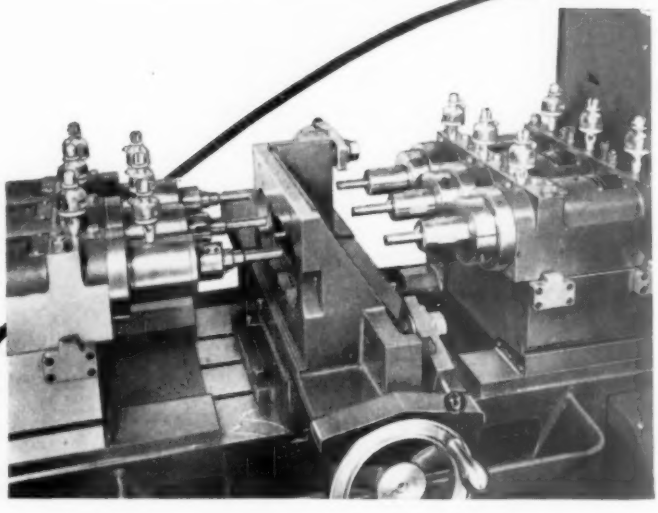
Distributors in Major Cities

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

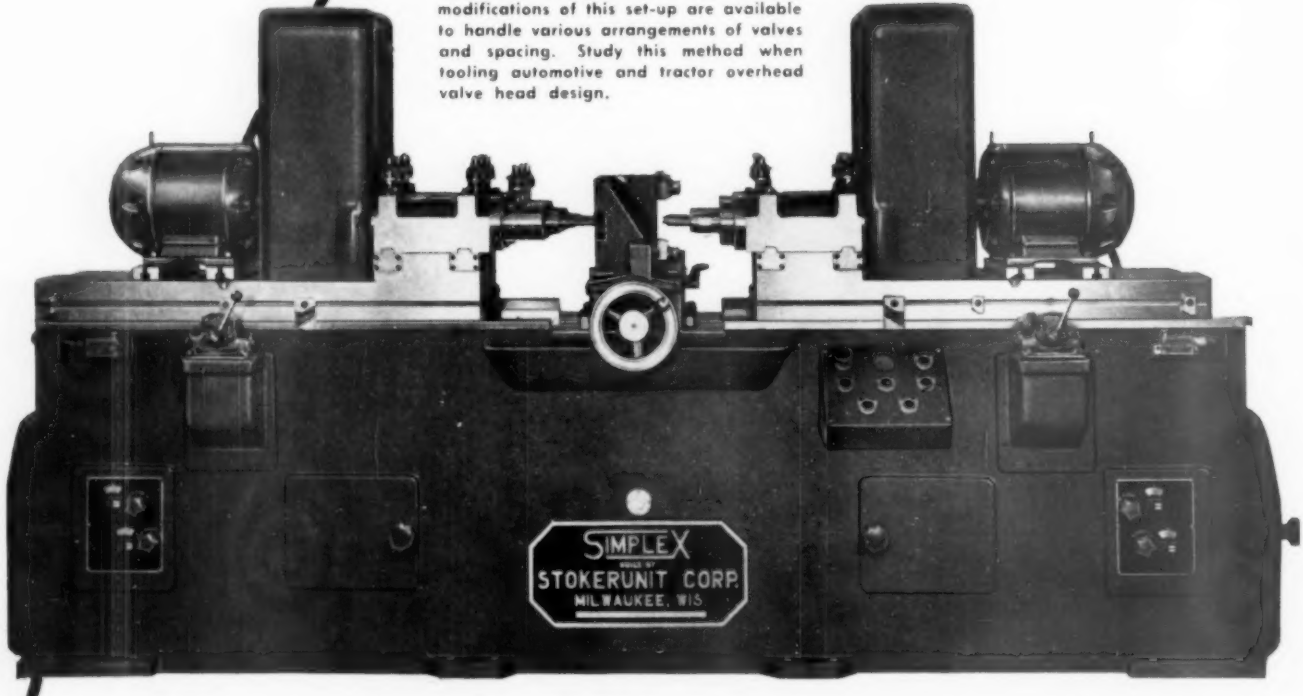
REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

SIMPLEX

The life and efficiency of a gasoline engine depends much upon the accuracy of valves and valve guides. One progressive manufacturer found that by placing the cylinder heads for an overhead valve engine in a simple cross-sliding fixture, semi-finish boring one side and precision boring the valve guides and valve seats from the other, he achieved the finest precision and engine performance.



This SIMPLEX 2U 2-way Precision Boring Machine, with three #1 spindles on each side and cross-sliding fixture, bores two intake and two exhaust valve guides and seats in a four step cycle. Many modifications of this set-up are available to handle various arrangements of valves and spacing. Study this method when tooling automotive and tractor overhead valve head design.



Precision Boring Machines

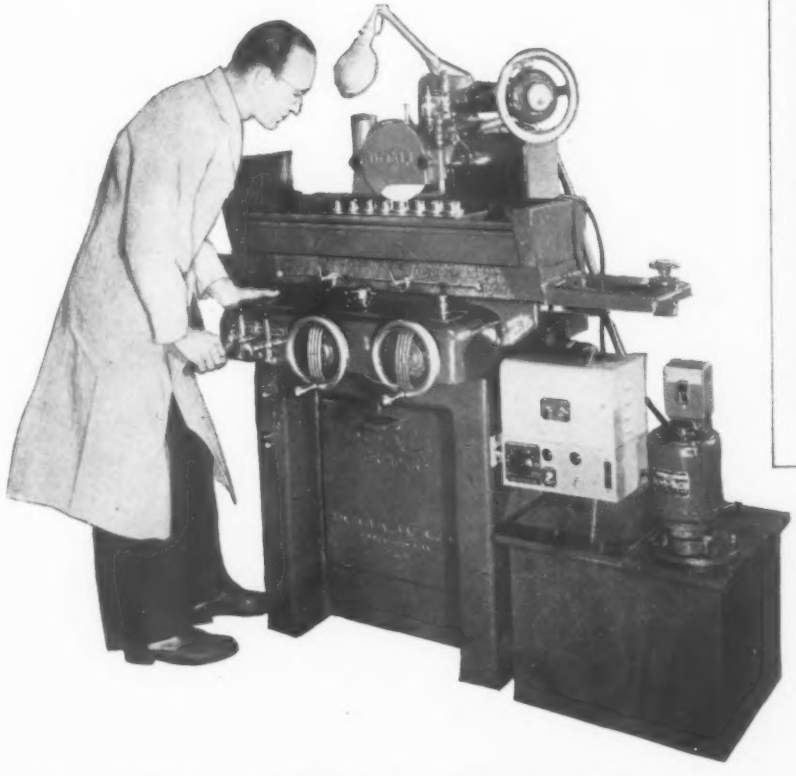
STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4528 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

Nickel Alloy Iron Assures WEAR-RESISTANT BEARING AREAS



Magnification 500 diameters

The highly developed pearlitic structure with well dispersed graphitic areas assures good anti-frictional properties and ready machinability as well as resistance to wear.

You probably know, first-hand, the troubles caused by wear and scoring on bearing areas of precision tools.

There is a proven answer to this problem.

It's the use of Nickel-chromium cast iron such as that shown in the photomicrograph. Notice the highly developed pearlitic structure, and the well dispersed graphitic areas for good anti-frictional properties and wear-resistance along with ready machinability.

Such alloy iron is used, for example, in DoALL precision surface grinders of the type illustrated. Gibs, ways, saddles, tables and other parts cast in this high-test Nickel alloyed iron made by the Staver Foundry Co., Virginia, Minn., make it possible for machines to retain their initial accuracy much longer than would similar castings of plain iron.

The DoALL Company states: "This high-test iron has proved most satisfactory for surface grinder cast parts, through years of experience under severe operating conditions. It possesses excellent wear-resistance on the bearing areas, and assures stability in the castings."

EMBLEM OF INCO SERVICE

TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

IN PARTS PRODUCTION...

Leadership BUILDS ON *Craftsmanship*

WINTER Tapper Taps are designed to thread enormous quantities of nuts on a rapid production basis. Straight shank tapper taps (in four different styles) and bent shank tapper taps are available for use in various types of nut tapping machines. The threaded section of WINTER Tapper Taps is made as short as possible to insure smooth operation and satisfactory results. For threading nuts in small quantities, WINTER Regular Nut Taps are recommended.

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the phone on your desk.

Craftsmanship of the highest order always has been employed in the manufacture of WINTER Taps.

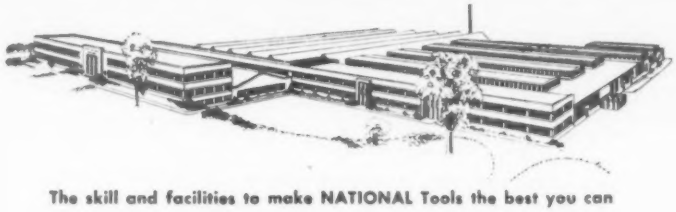
Winter Brothers COMPANY

WRENTHAM, MASS. and ROCHESTER, MICH. • Distributors in Principal Cities
A Division of the National Twist Drill and Tool Company • Branch Stores: San Francisco, Chicago, Detroit

...AND AT ASSEMBLY

NATIONAL produces a complete line of End Mills, in a wide variety of sizes and types. Shown below is one of NATIONAL'S Helex Fast Spiral End Mills, designed with high helex angle cutting edges for smooth action. With these mills, smooth, efficient operation is possible even at high speeds and feeds. Production is increased, breakage reduced, when you specify NATIONAL End Mills, part of NATIONAL'S complete line of Rotary Metal Cutting Tools.

Craftsmanship INSURES *Quality*



The skill and facilities to make NATIONAL Tools the best you can buy are supplied at NATIONAL'S great new plant in Rochester, Michigan.

LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL Cutting Tools and factory-trained men to serve you. Call them for cutting tools or any staple industrial product.

NATIONAL TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICHIGAN, U. S. A. Distributors in Principal Cities

Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

YES! } one Talide die will out-perform 20 steel dies

Talide
(TUNGSTEN CARBIDE)
Performance!

A Talide Die is one of the surest and easiest answers to long production runs and low unit cost. Depending upon the application, a Talide Die will out-perform and out-wear a steel die from 20 to 100 times.

With Talide Dies you can take much heavier drafts and increase speeds appreciably. Maintenance is reduced to a minimum, users saving as much as 50 hours polishing and redressing time on a single die.

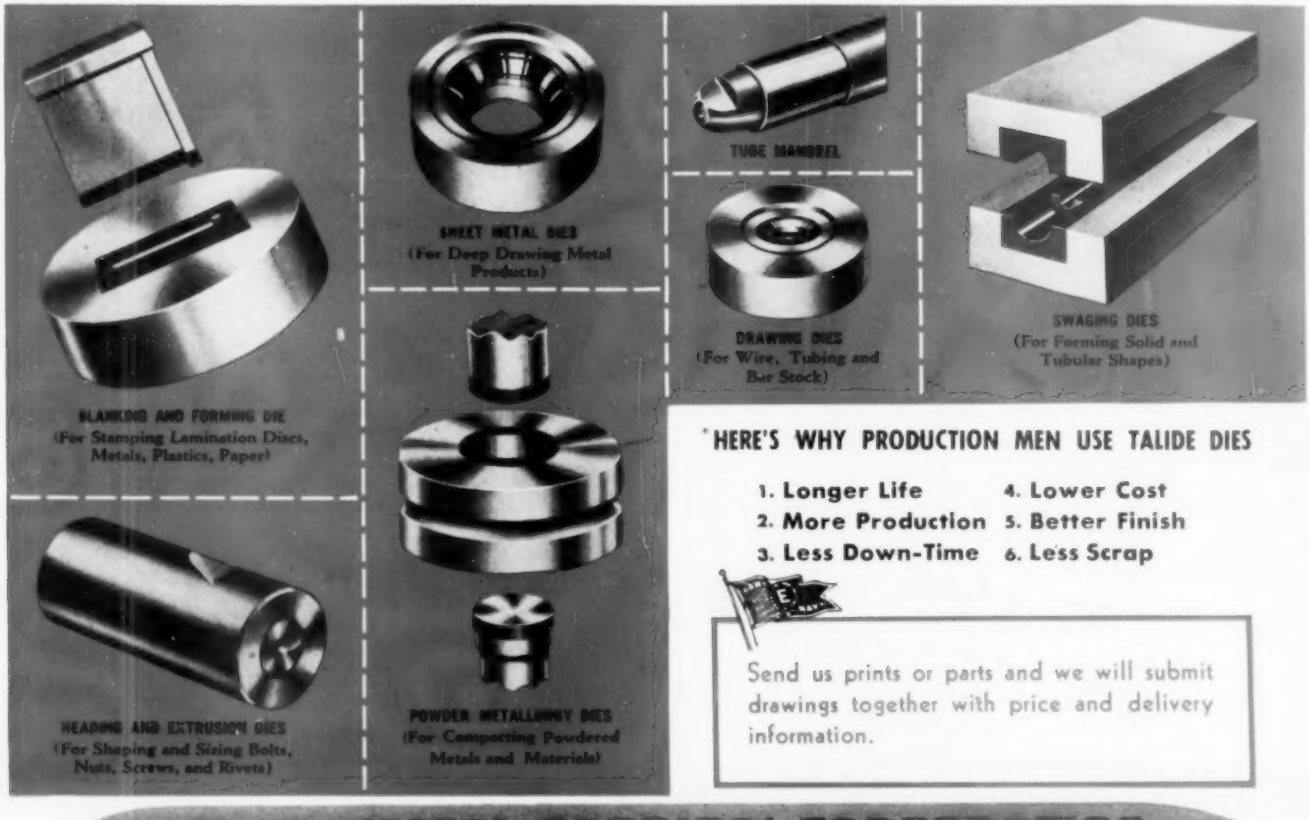
These dies take and impart a magnificent finish, and practically eliminate all surface defects, including galling, pickup, and scratching.

The production advantages of these dies derive from the great compressive strength plus the super hardness of Talide Metal (tungsten carbide). It's the hardest metal made.

Metal Carbides Corporation makes Talide Dies in all practical shapes and in all sizes from pinhole up to 24" inside diameter.

Send for Die and Wear Part Catalog 46-WP.

★ TALIDE METAL MEETS EVERY REQUIREMENT


BLANKING AND FORMING DIE
(For Stamping Lamination Discs, Metals, Plastics, Paper)
SHEET METAL DIES
(For Deep Drawing Metal Products)
TUBE MANDREL
DRAWING DIES
(For Wire, Tubing and Bar Stock)
SWAGING DIES
(For Forming Solid and Tubular Shapes)
HEADING AND EXTRUSION DIES
(For Shaping and Sizing Bolts, Nuts, Screws, and Rivets)
POWDER METALLURGY DIES
(For Compacting Powdered Metals and Materials)

HERE'S WHY PRODUCTION MEN USE TALIDE DIES

1. Longer Life
2. More Production
3. Less Down-Time
4. Lower Cost
5. Better Finish
6. Less Scrap

Send us prints or parts and we will submit drawings together with price and delivery information.

SINTERED CARBIDES
TALIDE
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS - DRAWING DIES - WEAR RESISTANT PARTS

ELIMINATES END THRUST

● All of these machines feature the continuous tooth herringbone geared, sixteen speed headstock *exclusively*. This form of gear tooth provides more tooth contact, resulting in greater strength, smoother action with end thrust eliminated through the opposed helix angle. One of the many Sidney features insuring a long, accurate machine life.

This exclusive feature, with its smooth flow of power, also accounts for the successful use of carbide cutting tools on so many jobs.

For power—rigidity—and precision investigate Sidney on your next lathe requirement. Bulletins on all sizes available.

Sidney Lathes

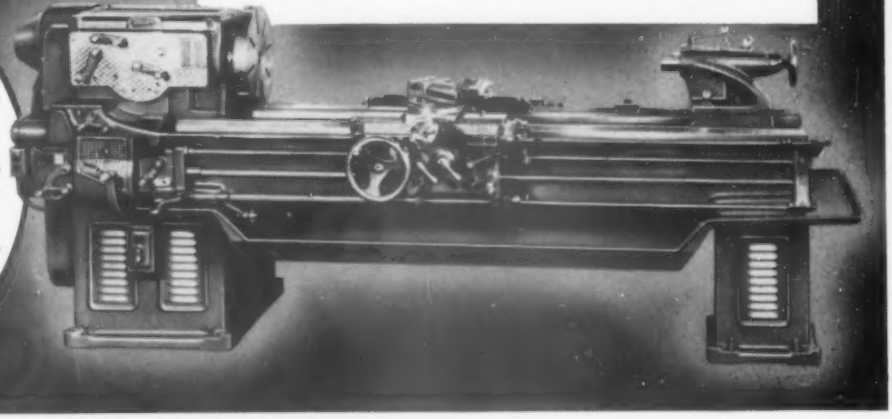
Builders of Precision Machinery

THE SIDNEY MACHINE TOOL COMPANY

SIDNEY • OHIO

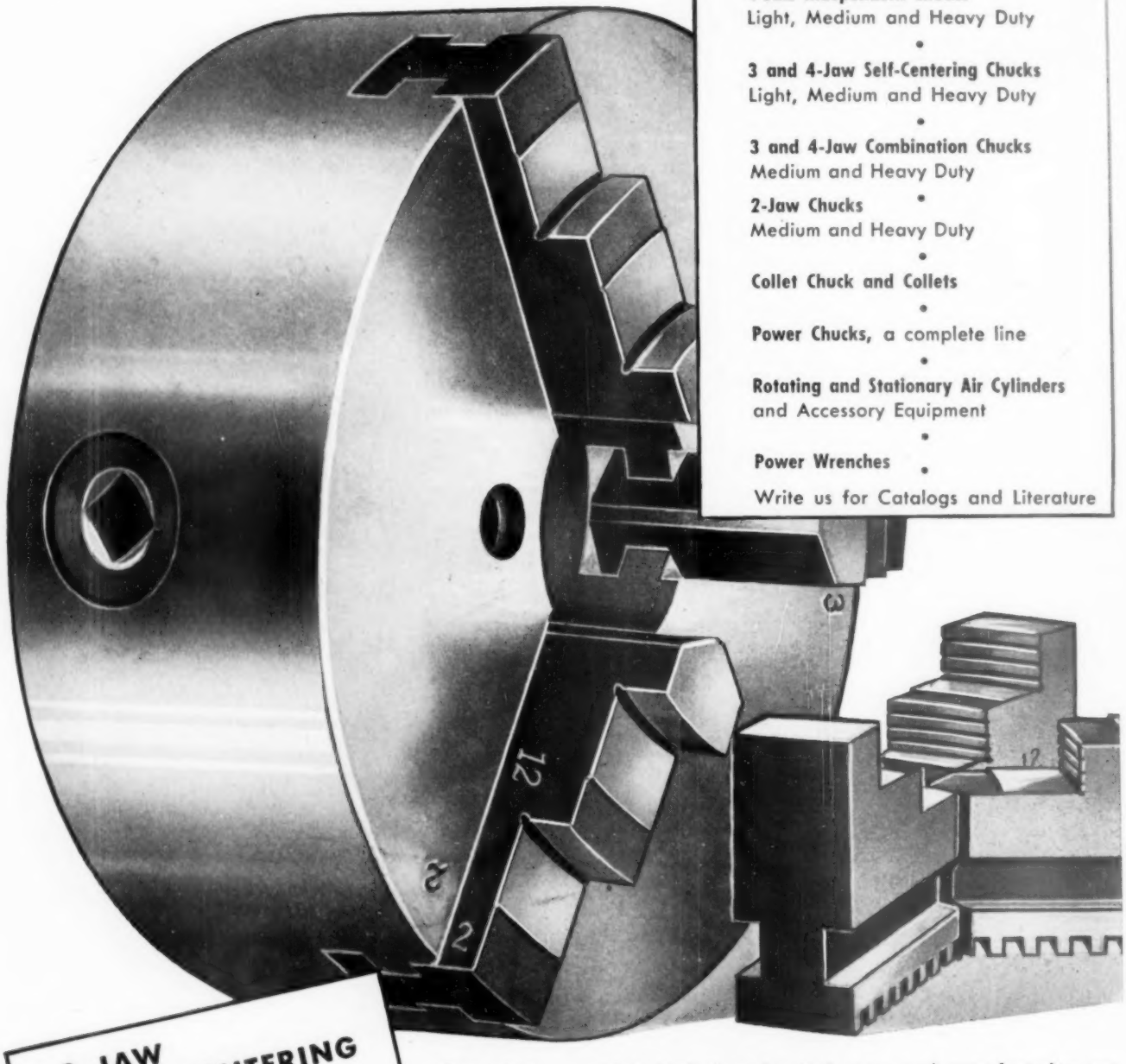
SIDNEY

ESTABLISHED 1904



CUSHMAN

AMERICA'S FINEST



3-JAW SELF-CENTERING CHUCKS

One of the essential chuck lines for tool room and manufacturing use. Made by Cushman in a complete range of sizes and with a full selection of jaw equipment for threaded spindles, American Standard Type A-1, Cam-Lock Type D-1 and Long Taper Key Drive Type E spindles. Recommended by leading machine tool builders and users throughout the world. Precision machine tools require the finest in self-centering chucks.

OTHER CUSHMAN STYLES & TYPES

4-Jaw Independent Chucks
Light, Medium and Heavy Duty

•

3 and 4-Jaw Self-Centering Chucks
Light, Medium and Heavy Duty

•

3 and 4-Jaw Combination Chucks
Medium and Heavy Duty

2-Jaw Chucks
Medium and Heavy Duty

•

Collet Chuck and Collets

•

Power Chucks, a complete line

•

Rotating and Stationary Air Cylinders
and Accessory Equipment

•

Power Wrenches

•

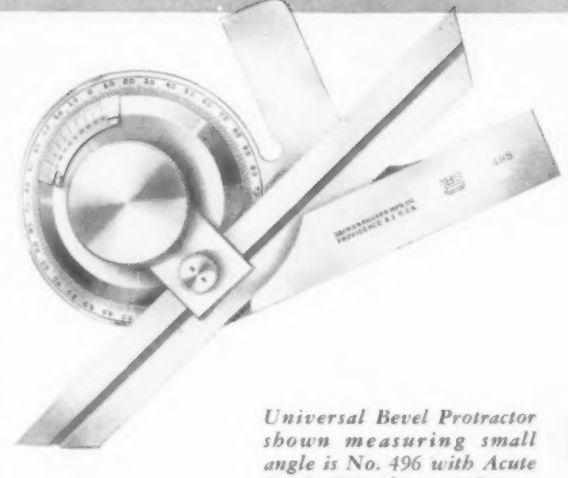
Write us for Catalogs and Literature

A World Standard **FOR PRECISION**

CUSHMAN CHUCK CO. • HARTFORD 2, CONNECTICUT, U.S.A.

CUSHMAN

TOOLS THAT EARN THE TRUST
of skilled machinists



Universal Bevel Protractor shown measuring small angle is No. 496 with Acute Angle Attachment. Immediately above is No. 495.

We urge buying through the Distributor

WHEN A MACHINIST lays out or establishes an angle with a Brown & Sharpe Bevel Protractor he has complete trust in the accuracy of a fine tool. That trust, whether inherited from an older craftsman, acquired from everyday use or even from apprenticeship days, has been earned by the superior performance of Brown & Sharpe Tools—by excellence of design and workmanship. This trust is an intangible quality that adds a very tangible extra value to the tools themselves—that makes each purchase of Brown & Sharpe Tools a satisfying, wise investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN & SHARPE TOOLS

WELL INFORMED ENGINEERS . . . Specify

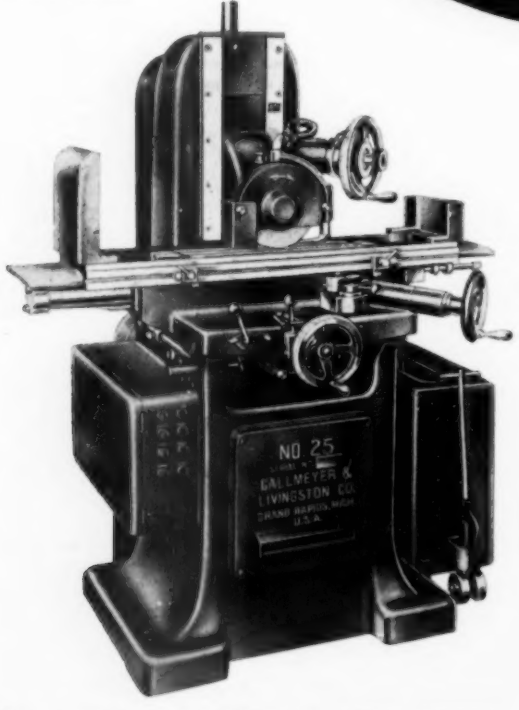
GRAND RAPIDS GRINDERS

• Every Grand Rapids Grinder, large or small, incorporates all of the essential features for fast, efficient, low-cost production.

For the manufacturer of small sized products, Grand Rapids No. 25 and No. 4 Grinders will solve the Tool Room grinding problems on dies and cutting tools. Grand Rapids Grinders are built in many sizes for many grinding jobs.

• No. 25 Grand Rapids Hydraulic Feed Surface Grinder

Complete information in Bulletin GL-101



• No. 4 Grand Rapids Universal Cutter and Tool Grinder

Complete information in Bulletin No. 1045

What "GRAND RAPIDS" Quality Means:

G & L cast their own close-grained gray iron, machine all parts to micrometric tolerances, and precision-assemble grinding machinery of unsurpassed performance. ***Grand Rapids*** means ***top*** quality in grinding machinery.

GRAND RAPIDS
MANUFACTURED BY
GALLMEYER & LIVINGSTON CO.
GRAND RAPIDS, MICHIGAN, U.S.A.

GALLMEYER & LIVINGSTON CO., 110 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICHIGAN

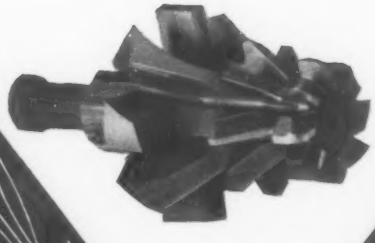
MEN
skilled by
experience
•
MATERIALS
selected for each
job
•
MACHINERY
that assures
precision

Herringbone Cutters,
Broaches, Gear Cutters,
Gear Shaper Cutters,
Circular and Flat Form
Tools,
Form Relieved Cutters,
ground and unground,
Hobs,
ground and unground,
Milling Cutters,
Special Tools

NATIONAL CLEVELAND TOOLS

NATIONAL Tools CLEVELAND

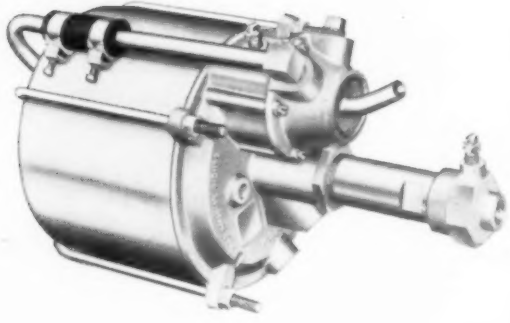
Cutting Tools for
All Purposes



NATIONAL TOOL Co.

11200 MADISON AVE — NATIONAL Tools CLEVELAND — CLEVELAND, OHIO

Bendix HYDROVAC *1ST* IN POWER-BRAKING



precision machined on SOUTH BEND LATHES

The Bendix Hydrovac power braking unit, proved by more than a million installations and billions of miles of service, is one of many outstanding technical achievements by Bendix Aviation Corporation which played important roles with our fighting forces and are now contributing to peace-time enterprise. Hundreds of South Bend Lathes are used by Bendix Aviation Corporation in their experimental laboratories, toolrooms, and manufacturing departments for the development and production of their products.

At left: Technician Henry Janowski, Experimental Department, Bendix Products Division of Bendix Aviation Corporation, using a 16-inch swing South Bend Precision Toolroom Lathe to machine the end plate for an experimental Bendix Hydrovac.

SOUTH BEND LATHES

South Bend Precision Engine Lathes and Toolroom Lathes are made in five sizes — with 9″, 10″, 13″, 14½″, and 16″ swings. Precision Turret Lathes are made in two sizes: Series 900 with ½″ maximum collet capacity and Series 1000 with 1″ maximum collet capacity. Please state size and type of lathe when requesting catalog.

LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

531 EAST MADISON STREET
SOUTH BEND 22, INDIANA

CHOCK-FULL OF INFORMATION

for you.

44 PAGES profusely illustrated with all types of Farquhar production presses, including heavy duty housing type presses, column type presses, gap type presses, straightening presses, all purpose presses, moulding presses, extrusion presses and miscellaneous presses. Capacities, 3 to 7200 tons.

Farquhar precision built hydraulic presses are turning out better, faster work at less cost in thousands of plants all over the world. You can increase profits with a Farquhar Press.

Name the job . . . Farquhar builds the press you need.

Write today for complete specifications and your copy of the new 1947 Hydraulic Press Catalog.

CLIP AND MAIL TODAY

19

A. B. FARQUHAR COMPANY
York, Pennsylvania

Gentlemen: Please send me, without obligation, the new 1947 Farquhar Hydraulic Press Catalog.

Name .....

Position .....

Firm .....

Street ..... State .....

City .....

HYDRAULIC PRODUCTION PRESSES

MATERIAL HANDLING CONVEYORS • SPECIAL MACHINERY

Farquhar

HYDRAULIC PRESS DIVISION

A. B. FARQUHAR COMPANY

1519 DUKE STREET, YORK, PENNSYLVANIA

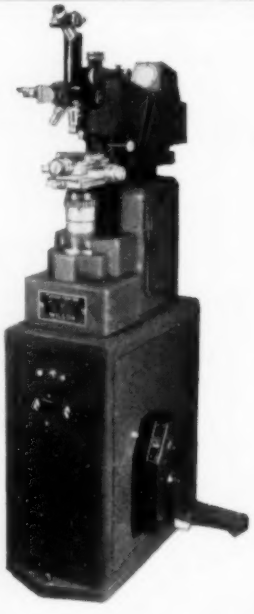
THREE MODELS ... but only ONE STANDARD of ACCURACY

TUKON TESTER *for* KNOOP and 136° PYRAMID HARDNESS NUMBERS

Your choice among the 3 models of "TUKON" Hardness Testers is governed only by your working requirements. Bench Model, Floor Model and Long Range Model (illustrated) are identical in one respect: each will give you the enduring, dependable accuracy so essential in laboratory hardness testing, especially for light load testing.

Bench and Floor Models for tests from 25 to 3,600 gram loads; Long Range Model, 25 to 50,000 gram loads.

"TUKON" Hardness Testers are made only by Wilson. Write for BULLETIN TK-46.



WILSON MECHANICAL INSTRUMENT CO., INC. ACCO

AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

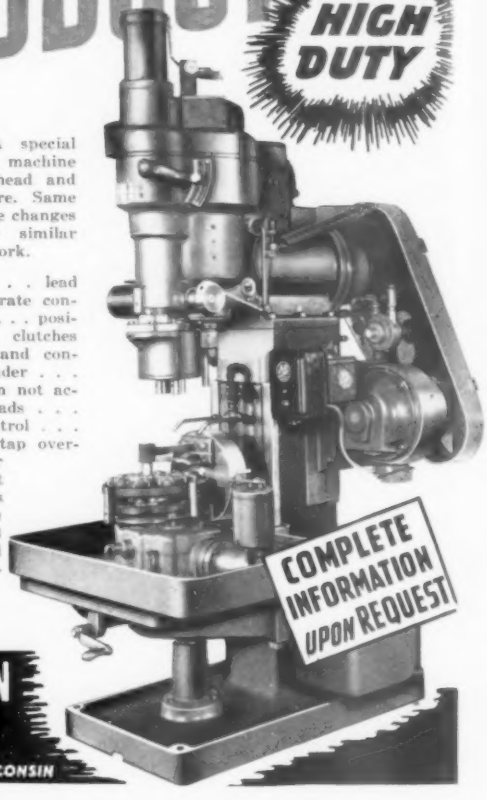
230-H PARK AVENUE, NEW YORK 17, N. Y.

for Continuous **PRODUCTION**

HIGH DUTY

Kaufman No. 10A special Hi-Duty Tapping machine with two spindle head and eight station fixture. Same machine with fixture changes can be used for similar second operation work.

Fully enclosed . . . lead screw and nut operate constantly in oil bath . . . positively wear-proof clutches instantly engaged and controlled by air cylinder . . . quick traverse when not actually cutting threads . . . accurate depth control . . . control to protect tap overload, and further protected against jamming if work is placed in upside down . . . class 3 fits always assured and perfectly controllable.

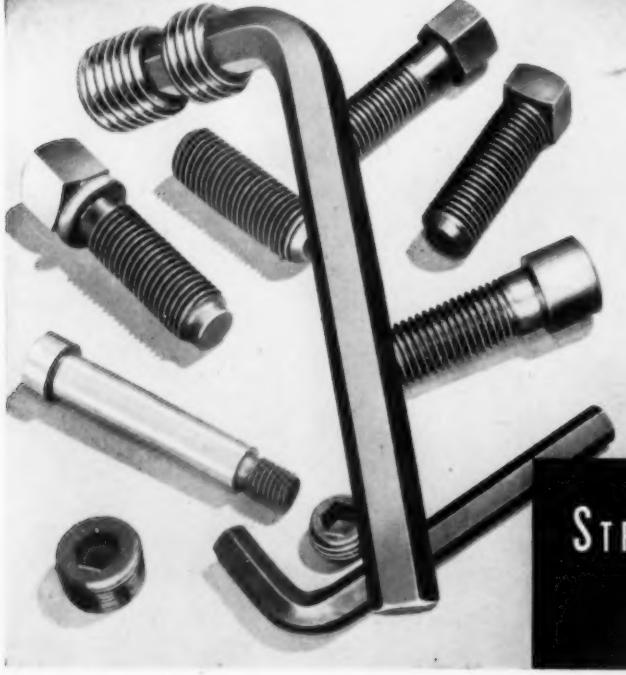


COMPLETE INFORMATION UPON REQUEST

KAUFMAN MFG. CO.

MANITOWOC, WISCONSIN

Mac-it ALLOY STEEL SCREWS



GET POSITIVE LOCKING ACTION with MAC-IT HOLLOW LOCK SCREWS!

Mac-it Hollow Lock Screws provide a locking arrangement that combines convenience with positive locking action. They lock as effectively after many thousand adjustments as they do the first time. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

DISTRIBUTED NATIONALLY BY

STRONG, CARLISLE & HAMMOND COMPANY

CLEVELAND 13, OHIO

MANUFACTURED BY

MAC-IT PARTS COMPANY LANCASTER, PA.

CENTERLESS WHEELS

Bay State *Fractional Grades* is no myth. It is one of our exclusive features and we are proud of it. This manufacturing refinement offers *three* degrees of hardness in a single normal grade . . . an extra that affords a much closer selection and makes it possible for you to obtain centerless wheels, as well as any other type, that are really "on the nose" when it comes to fit. Let us prove this statement with a trial.

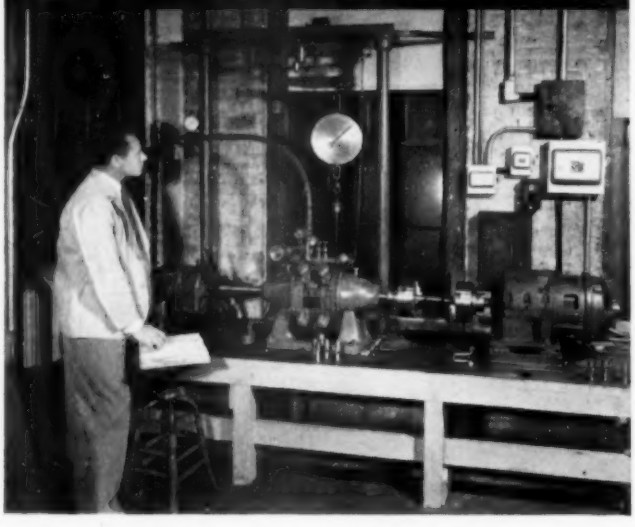
Branch Offices and warehouses — Detroit — Chicago
Distributors — All principal cities

BAY STATE

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

JUST A FEW CENTS MORE



But What a Difference

IN · WHAT · YOU · GET!!

Yes, a Curtis Universal Joint may cost a few cents more than other joints, but the smart designer or engineer **knows** the difference in the service delivered by Curtis Joints.

Machined from special alloy steel bars, not forged, the hubs of our joints are the same diameter throughout — giving uniform strength at all points. Compact, with greater strength, Curtis industrial type joints of a smaller size can many times replace larger, more cumbersome joints. A glance at our Engineering Data Chart showing breaking loads by joint sizes will convince any engineer.

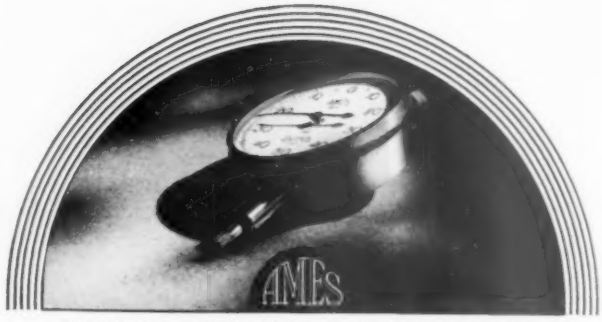
In addition, Curtis forks, centerblocks and pins are all heat treated for maximum toughness. Pin holes are broached and honed for perfect alignment — pins are centerless ground to close tolerance to reduce radial play — center blocks are precision ground for long wear with special oil grooves to permit adequate lubrication. Patented "Telltale" lock ring insures positive lockup of entire assembly and visible end shows ring is in proper locking position.

All this **means** smoother, longer life with lower maintenance cost — for just a few cents more per joint.

Specify **Curtis Universal Joints** always — Write for Engineering Data and useful Templates.

DEPT. B-2

CURTIS UNIVERSAL JOINT CO. INC. SPRINGFIELD MASS.

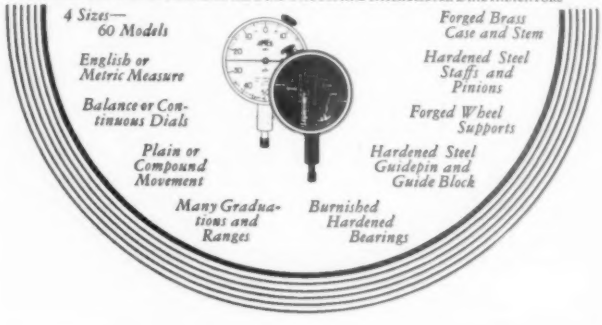


GOOD IN THE 4TH DIMENSION, TOO!

For tool checking or tough production jobs, Ames Dial Indicators are *time*-conserving as well as sensitive and accurate. They're *quickly* mounted and adjusted. Their dials are *instantly* readable. But *most time-saving* is their ability to stay *right* on the job, without internal adjustment—*longer* than any other indicator you can buy. Send for illustrated Catalogue.

Representatives in principal cities **B. C. AMES CO.** *30 Ames Street Waltham 54, Mass.*

MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS


4 Sizes— 60 Models
English or Metric Measure
Balance or Continuous Dials
Plain or Compound Movement
Many Graduations and Ranges
Burnished Hardened Bearings
Hardened Steel Guidepin and Guide Block
Forged Wheel Supports
Hardened Steel Staffs and Pinions
Forged Brass Case and Stem

A WHOLE SHOPFULL OF TOOLS IN ONE

Machinist - craftsmen find it unsurpassed for grinding, drilling, routing, carving, sanding, polishing and 9,994 other uses. Precision-engineered, AC - DC, with more exclusive features than any other tool.

Exclusive finger-grip brings hand closer for finer work

Complete with 36 accessories in fitted steel case

$22.50

$32.95 value if purchased separately

CASCO Electri-Craft Tool Kit

CASCO PRODUCTS CORPORATION • BRIDGEPORT 2, CONN.

DRILL HARDENED STEEL WITH ACE "Hi-Brinell" DRILLS

Carbide tipped drills from 17/64" [illegible]/2".

[illegible]bide drills in sizes up to 1/4".

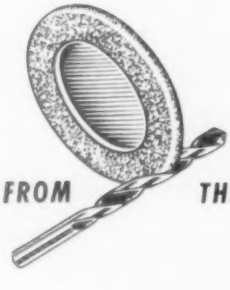
Ace "Hi-Brinell" Drills are designed and manufactur[illegible] especially for drilling steel hardened to a Rocky[illegible] C40-C65 and above. • These drills have ample neg[illegible] tive rake thus eliminating thin projecting angles a[illegible] permitting a faster flow of heat from the cutting edges. Negative rake also adds to the ruggedness of the drill. • The *solid* carbide drill has an extra heavy web. • Reclaiming costly dies is only one of the many profitable applications for Ace "Hi-Brinell" Drills.

ACE DRILL CORPORATION

MANUFACTURERS OF GROUND-FROM-THE-SOLID DRILLS AND REAMERS

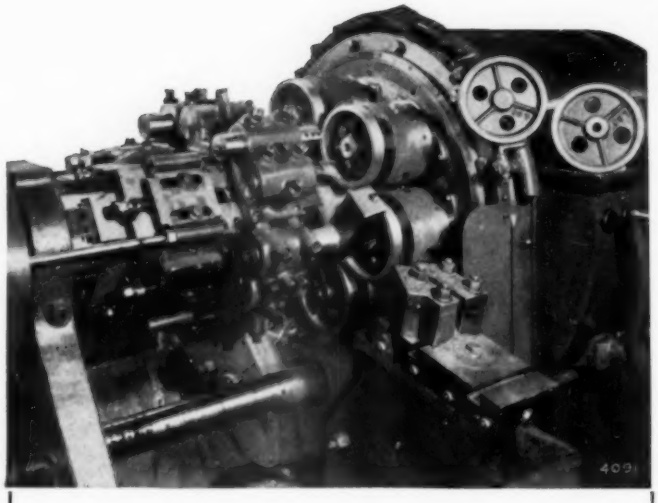
DETROIT 27, MICHIGAN

Ace also produces spiral fluted drills with spiral carbide tips for drilling abrasive non-ferrous materials.



GROUND FROM THE SOLID

2392



GEAR BLANKS ARE TURNED ACCURATELY AND SPEEDILY ON

"BAIRD" AUTOMATIC CHUCKING MACHINES

Here is shown a "Baird" No. 76H Chucking Machine, set up for turning, facing and boring gear Blanks made of a Special Cast Iron having a Rockwell hardness—85—90 B Scale.

The O.D. is finished turned to 6.800 plus or minus .001 and both faces are finished to 1.000 width, plus or minus .001.

The Hole is finished bored and reamed .750 diameter to plug gage and is concentric with the O.D. turning within .001 total indicator reading.

The work is held in Standard "Baird" Three Jaw Contracting Chucks, using stud type jaws for gripping. (The Spindle Turret is shown partially indexed to better illustrate the method of chucking.)

This gear is completely turned as shown to the required accuracy at the rate of 55 pieces per hour.

Selection of a spindle speed for each position, which is a special Baird Feature, permits high Spindle speeds in the finishing positions where carbide tools are used to produce the fine accurate surfaces required.

When you have Turning Operations that should be done profitably

"ASK BAIRD ABOUT IT."

THE BAIRD MACHINE COMPANY
STRATFORD, CONN.

Because . . . . .

DRILL JIG BUSHINGS

AND

GAGES

are production tools, and because your . . . .

TOOLS E PRECISION MADE

Production
Depends on
Qualified service,

. . . . both items have been made available for prompt delivery.

Write today for particulars

ECONOMY TOOL & MACHINE CO.

MILWAUKEE 14, WISC., U.S.A.

MORE BIG NEWS ABOUT MACHINE TOOLS

29

29 TYPES ADDED TO WAA LIST OF FIXED PRICE TOOLS

New fixed price policy now applies to a total of 60 important types and makes of general purpose tools. See the next 3 pages for details of this *high speed* sales program.

GOVERNMENT WAA SURPLUS

Floor Grinders—With Wheels over 6" Diameter and Driving Motors Other Than 110 Volt.

Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End.

Chucking Machine—Bullard Mul-au-Matic Vertical, Multiple Spindle Type.

Chucking Machine—Six Spindle Automatic, Horizontal.

Drilling Machines—Deep Hole, Pratt and Whitney.

Drilling and Tapping Machine—Multiple Spindle Automatic.

Drilling Machine—Multiple Spindle, Fixed Center-Drills, Natco.

Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine).

Gear Tooth Lapper—External and/or Internal Gear Tooth Lapping Machine.

Gear Tooth Shaver—Rack or Rotary Type, External or Internal Gear Shaver.

Contour Cutter Grinder.

Grinders, Cam and Crank Pin.

Grinders, Miscellaneous—Spline and Radius Grinders.

Lapping Machines—Flat, Norton Hydrolap.

Lathes, Production—Between Centers Automatic, Horizontal Single Spindle.

Slot Milling Machine.

Milling Machine—Spline.

Milling Machine—Bed Type, Vertical.

Planer—Craven Bros.

Screw Machine—Multiple Spindle Bar Type Automatic.

Vertical Shapers and Slotters.

Speed Lathes—All Types and Sizes.

The following types of tools were originally repriced on October 1st. They are listed again because additional makes and models have been put on the new fixed price schedule.

Gear Hobber—Horizontal.

Gear Hobber—Vertical, Muir.

Gear Tooth Grinder—Generating Type, For Spur and Helical Gears.

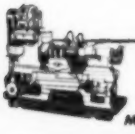
Milling Machine—Bed Type, Horizontal Spindle, Plain or Rise and Fall, Simplex or Duplex.

Milling Machine—Vertical, Knee Type Except Bench Models.

Tapping Machine—Vertical, Single or Multiple Spindle.

bargains like this ready for IMMEDIATE DELIVERY

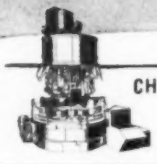
GOVERNMENT WAA SURPLUS



LATHES, PRODUCTION—BETWEEN CENTERS AUTOMATIC, HORIZONTAL SINGLE SPINDLE

Manufacturer: JONES AND LAMSON MACHINE CO., SPRINGFIELD, VT.

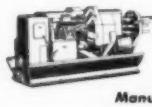
MODEL	SIZE AND CAPACITY	SALES PRICE
8" Fay Automatic	8" swing x 21" center to center	$ 796.00
8" Fay Automatic	8" swing x 33" center to center	843.00
8" Fay Automatic	8" swing x 45" center to center	889.00
12" Fay Automatic	12" swing x 21" center to center	$1195.00
12" Fay Automatic	12" swing x 33" center to center	1261.00
12" Fay Automatic	12" swing x 45" center to center	1330.00
12" Fay Automatic	12" swing x 63" center to center	1465.00
12" Fay Automatic	12" swing x 81" center to center	1636.00
16" Fay Automatic	16" swing x 21" center to center	$2079.00
16" Fay Automatic	16" swing x 33" center to center	2148.00
16" Fay Automatic	16" swing x 51" center to center	2284.00
20" Fay Automatic	20" swing x 25" center to center	$1569.00
20" Fay Automatic	20" swing x 37" center to center	1638.00
24" Fay Automatic	24" swing x 69" center to center	2717.00
Manufacturer: LODGE AND SHIPLEY MACHINE TOOL COMPANY, CINCINNATI, OHIO		
No. 1 "Duomatic"	16" swing over bed, 10" over slides, 39" centers	$1078.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 15" centers	1772.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 27" centers	1826.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 39" centers	1879.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 51" centers	1932.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 63" centers	1986.00
No. 3A "Duomatic"	20" swing over bed, 10" over slides, 75" centers	2039.00
Manufacturer: SENECA FALLS MACHINE COMPANY, SENECA FALLS, N. Y.		
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 8" centers	$ 746.00
IMP Lo-Swing	4-1/2" swing over front and rear carriage, 12" centers	769.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 10" centers	768.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 16" centers	815.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 22" centers	$ 854.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 34" centers	965.00
LR Lo-Swing	5-1/2" swing over front and rear carriage, 46" centers	1021.00
R-14 Lo-Swing	11-1/2" swing over front and rear carriage, 34" centers	2627.00
Manufacturer: SUNDSTRAND MACHINE TOOL COMPANY, ROCKFORD, ILL.		
8 Automatic Lathe	8" swing x 15" center to center	$ 715.00
8 Automatic Lathe	8" swing x 21" center to center	757.00
8 Automatic Lathe	8" swing x 28" center to center	816.00
10 Automatic Lathe	10" swing x 16" center to center	$ 976.00
10 Automatic Lathe	10" swing x 22" center to center	1020.00
10 Automatic Lathe	10" swing x 34" center to center	1128.00
10 Automatic Lathe	10" swing x 46" center to center	1242.00
12 Automatic Lathe	12" swing x 22" center to center	$1126.00
12 Automatic Lathe	12" swing x 34" center to center	1233.00
12 Automatic Lathe	12" swing x 46" center to center	1349.00
15 Automatic Lathe	15" swing x 22" center to center	$1102.00



CHUCKING MACHINE—AUTOMATIC, VERTICAL, MULTIPLE SPINDLE TYPE

Manufacturer: BULLARD COMPANY, BRIDGEPORT, CONN.

MODEL	SIZE AND CAPACITY	SALES PRICE
D "Mult-au-Matic"	34" swing 4 spindle	$19393.00
D "Mult-au-Matic"	8" swing 6 spindle	6136.00
D "Mult-au-Matic"	12" swing 6 spindle	6506.00
F "Mult-au-Matic"	7" swing 12 spindle	6380.00



SCREW MACHINE—SINGLE AND MULTIPLE SPINDLE BAR TYPE AUTOMATIC

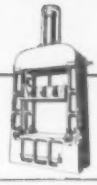
Manufacturer: CONE AUTOMATIC MACHINE COMPANY, WINDSOR, VT.

MODEL	SIZE AND CAPACITY	SALES PRICE
SK Automatic Screw Machine	1-1/2" diameter bar capacity, 6 spindle	$3066.00
SN Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3307.00
SD Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3446.00
SE Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	3932.00
SF Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	4432.00
WW Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	$3065.00
XX Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	3132.00
DD Automatic Screw Machine	1-1/2" diameter bar capacity, 8 spindle	2360.00
VB Automatic Screw Machine	1-5/8" diameter bar capacity 8 spindle	3132.00
MM Automatic Screw Machine	1-7/8" diameter bar capacity, 8 spindle	2529.00
Manufacturer: GREENLEE BROTHERS AND COMPANY, ROCKFORD, ILL.		
1" Automatic Screw Machine	1" diameter bar capacity, 6 spindle	$2216.00
1-5/8" Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	2636.00
2" Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3269.00
Manufacturer: THE NATIONAL ACME COMPANY, CLEVELAND, OHIO		
3/8" R-6 Automatic Screw Machine	3/8" diameter bar capacity, 6 spindle	$2105.00
9/16" RA-6 Automatic Screw Machine	9/16" diameter bar capacity, 6 spindle	1602.00
1" RA-6 Automatic Screw Machine	1" diameter bar capacity, 6 spindle	3036.00
1-1/4" RA-6 Automatic Screw Machine	1-1/4" diameter bar capacity, 6 spindle	3465.00
1-5/8" RA-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	$4118.00
1-5/8" RB-6 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	4118.00
2" RA-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RB-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	4350.00
2" RAS-6 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	$4350.00
2-5/8" RA-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
2-5/8" RB-6 Automatic Screw Machine	2-5/8" diameter bar capacity, 6 spindle	4969.00
3-1/2" RA-6 Automatic Screw Machine	3-1/2" diameter bar capacity, 6 spindle	5781.00
Manufacturer: NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.		
60 Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	$1778.00
204 Automatic Screw Machine	5/8" diameter bar capacity, 6 spindle	1059.00
60 Automatic Screw Machine	1" diameter bar capacity, 6 spindle	2741.00
61 Automatic Screw Machine	1-3/8" diameter bar capacity, 6 spindle	$2299.00
61 Automatic Screw Machine	1-5/8" diameter bar capacity, 6 spindle	3373.00
61 Automatic Screw Machine	2" diameter bar capacity, 6 spindle	3560.00
61 Automatic Screw Machine	2-1/4" diameter bar capacity, 6 spindle	3662.00

CHUCKING MACHINE—SIX SPINDLE AUTOMATIC, HORIZONTAL

Manufacturer: NEW BRITAIN-GRIDLEY MACHINE COMPANY, NEW BRITAIN, CONN.

MODEL	SIZE AND CAPACITY	SALES PRICE
652 Automatic, Work Rotating Chucker	2" swing	$2682.00
654 Automatic, Work Rotating Chucker	3-1/2" swing	2885.00
65 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
665 Automatic, Work Rotating Chucker	6-1/2" swing	5139.00
675 Automatic, Work Rotating Chucker	7-1/2" swing	$5313.00
16 Automatic, Work Rotating Chucker	9" swing	4863.00
16 Automatic, Work Rotating Chucker	10-1/4" swing	5458.00
656 Automatic, Work Rotating Chucker	5-3/4" swing	5058.00
Manufacturer: THE BAIRD MACHINE COMPANY, BRIDGEPORT, CONN.		
76H Automatic, Work Rotating Chucker	7" swing	$3880.00



FORGING MACHINERY AND HAMMERS—IMPACT STAMPING TYPE

Manufacturer: CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.

MODEL	SIZE AND CAPACITY	SALES PRICE
Elpc Coco Stamp	30" R to L, 24" F to B, 36" stroke	$1343.00
Elpace Coco Stamp	48" R to L, 36" F to B, 42" stroke	2074.00
Elplain Coco Stamp	48" R to L, 48" F to B, 42" stroke	2455.00
Elpoint Coco Stamp	66" R to L, 36" F to B, 66" stroke	2471.00
Elplank Coco Stamp	66" R to L, 48" F to B, 48" stroke	$3684.00
Elplanet Coco Stamp	66" R to L, 60" F to B, 48" stroke	3896.00
Elpale Coco Stamp	90" R to L, 48" F to B, 48" stroke	3922.00
Elpublic Coco Stamp	90" R to L, 60" F to B, 48" stroke	4642.00

25% OR MORE BELOW USED MARKET

- purchasing can be done either directly with the 33 WAA Regional Offices or with one of the 3,000 "approved" dealers.
- one low price everywhere — any regional office, dealer or site sale.
- no waiting for priorities, complicated figuring of prices or other delays.

MILLING MACHINE—BED TYPE, HORIZONTAL SPINDLE PLAIN OR RISE AND FALL, SIMPLEX OR DUPLEX

Manufacturer: BROWN AND SHARPE MFG. CO., PROVIDENCE, R. I.

MODEL	SIZE AND CAPACITY	SALES PRICE
000 Plain (Simplex)	6" table travel x 8" width	$ 394.00
10 Plain, Electrically Controlled (Simplex)	12" table travel x 10" width	789.00
12 Plain, Electrically Controlled (Simplex)	18" table travel x 12" width	969.00
17 Plain, Electrically Controlled (Simplex)	24" table travel x 12" width	1009.00
Manufacturer: CINCINNATI MILLING AND GRINDING MACHINES, INC., CINCINNATI, O.		
34-36 Plain, Hydromatic	36" table travel x 16" table width	$1550.00
35-48 Plain, Hydromatic	48" table travel x 20" table width	1918.00
56-90 Plain, Hydromatic	90" table travel x 24" table width	2807.00
4-36 Duplex, Hydromatic	36" table travel x 16" table width	2471.00
Manufacturer: KEARNEY AND TRECKER CORPORATION, MILWAUKEE, WIS.		
1218 Automatic, Simplex	18" table travel x 12" table width	$1206.00
1842 Automatic, Simplex	42" table travel x 18" table width	1623.00
1854 Automatic, Simplex	54" table travel x 18" table width	1662.00
Manufacturer: KENT-OWENS MACHINE COMPANY, TOLEDO, OHIO		
1-B Plain, Hydraulic, Single Spindle	8" table travel x 9" width	$ 454.00
2-20-DS Plain, Hydraulic, Double Spindle	20" table travel x 12" width	1433.00

DRILLING MACHINE—MULTIPLE SPINDLE WITH CENTRAL DRIVING UNIT

Manufacturer: NATIONAL AUTOMATIC TOOL CO., INC., RICHMOND, IND.

These prices apply only to exact model listed and cover types with nonadjustable fixed center drill spindle or spindles which are all driven by a separate motor mounted directly above spindle gear box and moving vertically with the gear box.

MODEL AND DESCRIPTION	SALES PRICE
Mod. B-2A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. B-3A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. B-4A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. B-5A Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00
Mod. 4-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	2196.00
Mod. 5-AL Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	4052.00
Mod. 2-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	$1417.00
Mod. 3-AH Natco Vert. Multi-Spindle Fixed Centers Drill With Separate Spindle Driving Motor	1780.00

The above prices do not apply to general purpose adjustable Multi-Spindle Natco drilling machines equipped with slip spindle plates or with standard adjustable spindles.

ALL TOOLS SUBJECT TO PRIOR SALE

Get this new catalog list

If you can use any of the 29 additional types of production tools on which fixed prices have been established, send today for WAA's new (January 15) Fixed Price Machine Tool Catalog giving all sizes and new fixed prices.

PLUS—Catalog of sizes, models and prices of 31 types of production tools previously (October 15) placed on the fixed price list. For copies of one or both of these catalogs, simply write, phone or wire the nearest WAA office listed on the 4th page of this advertisement.

EXPORTERS: Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily saleable in other countries. Watch for other offerings; many of them may be of interest to your clients.

WAR ASSETS ADMINISTRATION

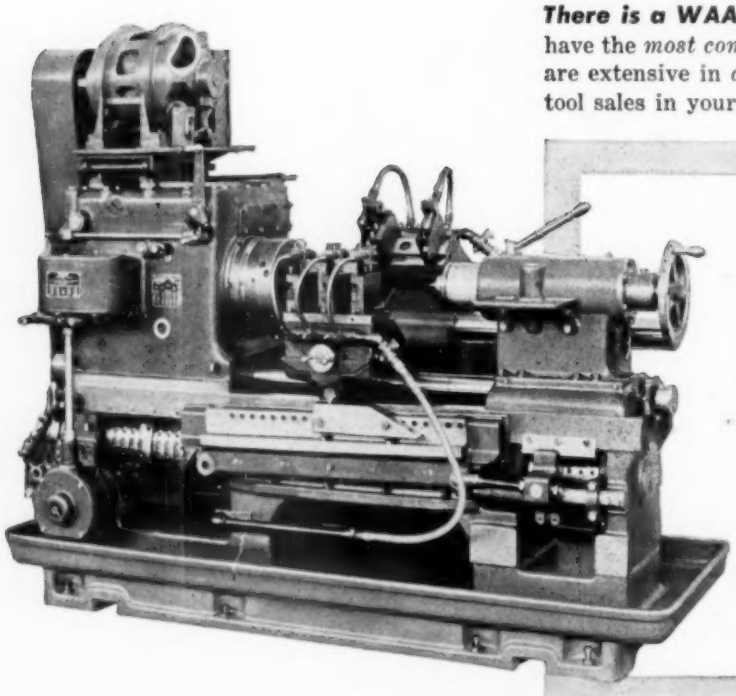
GOVERNMENT WAA SURPLUS

One Call ...

TO BUY AND GET DELIVERY

To purchase the machine tools you need, visit any of the WAA offices listed below, your regular machine tool dealer, or any WAA Machine Tool Site Sale advertised in your local paper. You can arrange *on the spot* for immediate delivery. Shipping time must be allowed for, however, when the particular machine you want is located elsewhere. But you will not have to wait for lengthy clearances of priorities or nation-wide search of stocks. All machines are available for immediate sale.

There is a WAA office near you – Offices listed below with a star have the *most complete* inventories of surplus machine tools—but stocks are extensive in *all* offices. Watch your newspaper for special machine tool sales in your area.



HOW NEW PRICE POLICY WORKS

New prices take into consideration the estimated cost of engineering and rebuilding the tools. For example:

Here is how WAA's new price has been set on a 20 inch Fay Automatic Production Lathe, 37" center to center, a Jones and Lamson machine. WAA code No. 3416-61-62-57.

Price (New)	$7,059.00
Previous WAA Sales Price (based on depreciation primarily)	3,529.00
Average Market Value	2,130.00
New WAA Fixed Sales Price	1,638.00
Available for Rebuilding	$ 492.00

MACHINE TOOL SALES DIVISION

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • *Boston • Charlotte • *Chicago • Cincinnati • *Cleveland Denver • *Detroit • Grand Prairie, Tex. • Helena • Houston • Jacksonville • Kansas City, Mo. • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • *New York • Omaha • *Philadelphia Portland, Ore. • Richmond • Salt Lake City • *St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

686-3

IT'S NOT ONLY *Which* CUTTING MATERIAL

BUT HOW YOU USE IT THAT COUNTS

STEEL SCRAP

is urgently needed

● *Help the Steel Industry to help you get more Steel*

RUSH YOUR SCRAP BACK TO THE MILLS

THERE'S hardly a single cutting operation that can't, in some way, be improved. Our record files contain hundreds of instances. Redesign of the tool itself often works wonders. In other cases, a switch of cutting materials shows a marked increase in production, or in pieces between grinds.

That's the job of our Mill Service organization—to work with you for improvement—and the Allegheny Ludlum line now offers you absolutely complete selection. The range extends from Carmet carbide metal blanks and tipped tools—through ALX cast alloy-metal ground bits—to DBL and Super DBL low-tungsten high speed steels, as well as the various high-tungsten and "moly" types of high speed steels. Call us in, any time, anywhere.

AL

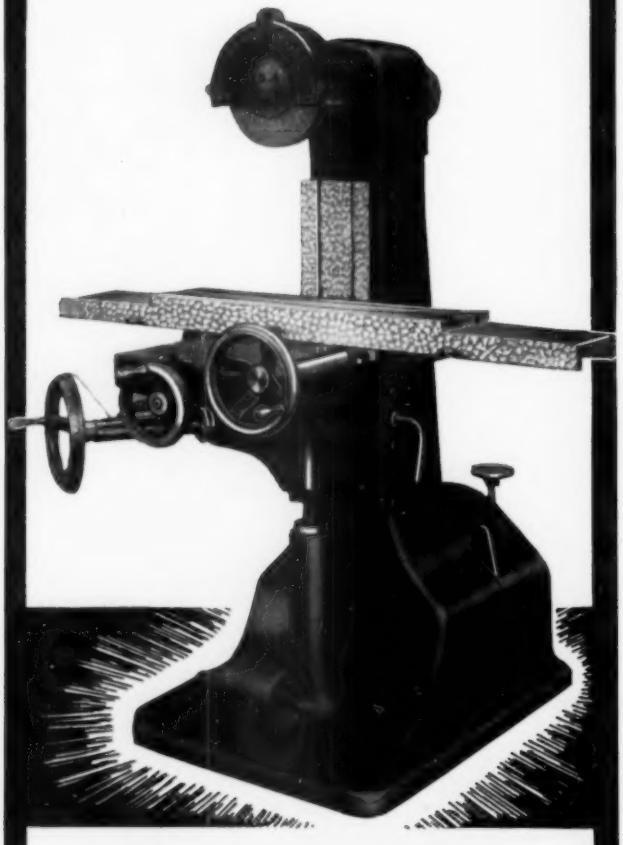
ALLEGHENY LUDLUM

STEEL CORPORATION

General Offices
Brackenridge, Pennsylvania

W&D 371

NO. 11 LEACH SURFACE GRINDER



EXTRA LARGE CAPACITY

6" x 24" x 12"

HEIGHT 52"

WEIGHT 850 lbs.

2 SPINDLE SPEEDS

2600 and 3500 R. P. M.

$650.00

Complete with motor of standard Current characteristics F. O. B. Factory.

For further information write Dept. H

NATIONAL DISTRIBUTORS

H. LEACH MACHINERY CO.

387 CHARLES ST PROVIDENCE 4 R I

AGENTS IN ALL PRINCIPAL CITIES

Proof of LOWER PRODUCTION COSTS with REED Triple-Die *Precision Thread Rolling!*

780 PIECES AN HOUR

Part: Automotive Ball Stud.
Operation: Burnishing Ball Surface and Neck.
Ball Diameter: ⅞".
Material: Steel S.A.E. 3115.

Rolled on the **REED Cylindrical-Die THREAD ROLLER** Model A22

For complete specifications, write for Bulletin A22-1.

REED ROLLED THREAD DIE CO.
Worcester 2, Mass., U. S. A.

REED

Knurls — Thread Rolling Dies and Machines

Formerly ROLLED THREAD DIE CO. and REED SMALL TOOL WORKS

ARE YOUR TOOLS PRODUCING AT MAXIMUM?

● In manufacture of special tools for maximum production the skill of the tool craftsman is the most essential element.

Andersons, Inc., specializing in precision tools and fixtures, are so manned and equipped as to assure the best in tool design and craftsmanship.

Your inquiries for special tooling are solicited and will receive prompt, efficient service. Let us help you solve your tooling problems.

GAGES, FIXTURES, SPECIAL TOOLS

DOVETAIL AND CIRCULAR FORM TOOLS—MILLING CUTTERS—END MILLS—REAMERS

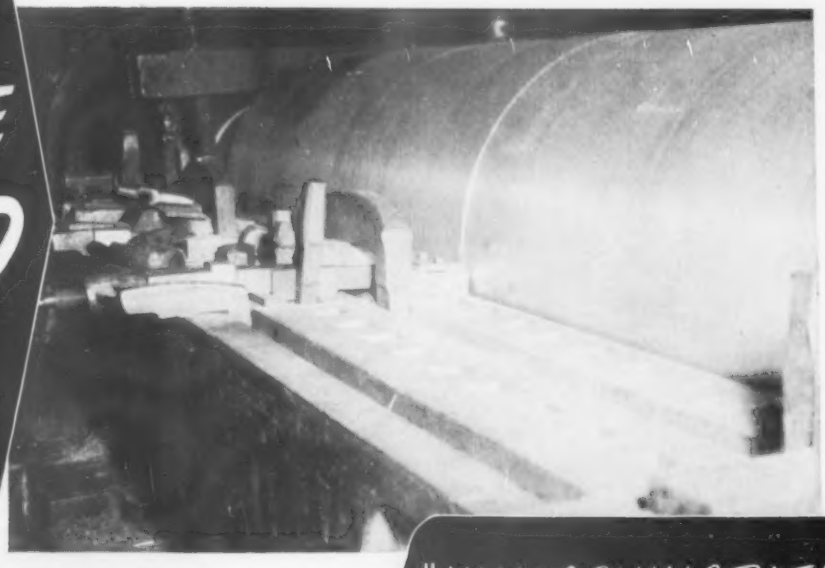
Write Us or Phone Buckingham 3417

Andersons, Inc.

2325 NELSON STREET • CHICAGO 18, ILLINOIS

NOW THEY CAN BE TURNED

*and at Far Less Cost**

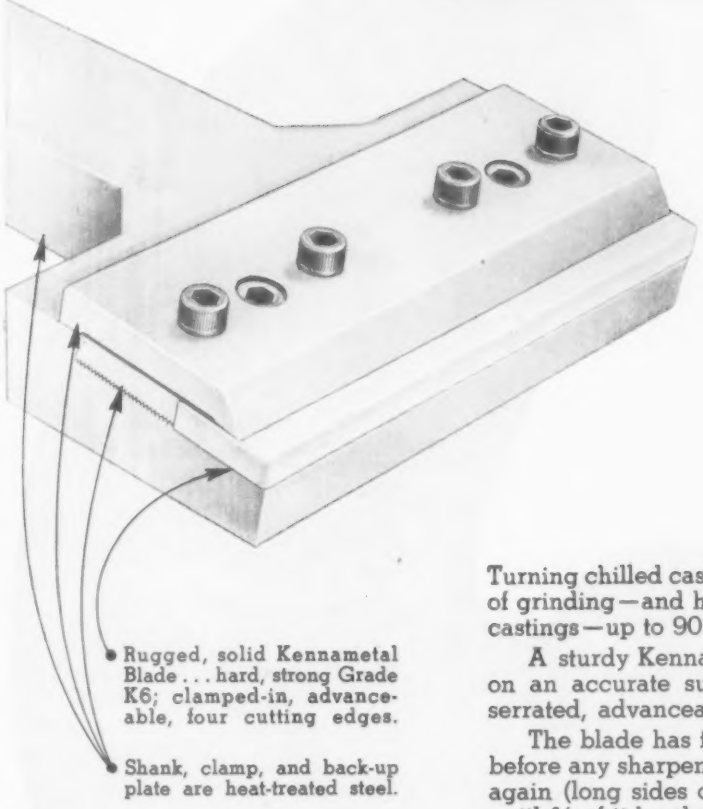


"UNMACHINABLE" CHILLED CAST-IRON ROLLS

[UP TO 90 SCLEROSCOPE]

CAN NOW BE TURNED with the NEW

KENNAMETAL ROLL-TURNING TOOL



- Rugged, solid Kennametal Blade . . . hard, strong Grade K6; clamped-in, advanceable, four cutting edges.
- Shank, clamp, and back-up plate are heat-treated steel.

Available in four sizes — cutting widths of blades: 4", 6", 8", and 10".

Turning chilled cast-iron rolls costs far less than the traditional process of grinding—and here's the tool that can turn even "unmachinable" castings—up to 90 Scleroscope . . .

A sturdy Kennametal Grade K6 blade is securely held in place on an accurate surface of the supporting shank by a clamp and serrated, advanceable back-up plate—each of hardened steel.

The blade has four cutting edges that may be used in succession before any sharpening is required. Then it can be reground time and again (long sides only) and advanced each time to cutting position, until ⅔ of it has been utilized.

There's one positive way to prove this new Kennametal tool can greatly reduce your cast-iron roll production costs—and that's under actual working conditions in your shop. We'll demonstrate—invite us.

*For example, a roll that required 25 hours for rough grinding was turned with two 8" Kennametal Tools in 8½ hours.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

Now..

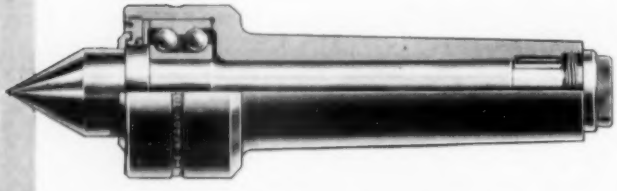
YOU CAN SPECIFY

RED-E

AND SAVE ON CENTER COSTS, TOO!

SHANK TYPE

Light series. Preloaded ball bearings. Replaceable high speed steel points. Smooth, sustained accuracy.



BALL AND ROLLER BEARING TYPE

Heavy duty series. Preloaded ball bearings in head . . . roller bearings in shank. Accuracy at high speeds, heavy feeds.

At new low costs, RED-E Standard Ball Bearing Centers — designed and built by engineers who thoroughly understand center requirements — are available to meet the majority of applications where high speed steel cutting tools are used. New Departure double row preloaded ball bearings assure accurate performance, longer life under continuous operation. Priced to mean real savings!

Machine tool manufacturers, production executives, shopmen agree that precision machining depends largely on *precision centers* . . . and is why they so often specify RED-E Centers.

Write *today* for details.

CENTER *Specialists Since* 1908

RED-E-TOOLS

THE READY TOOL COMPANY
550 Iranistan Ave., Bridgeport 5, Conn.

SHELDON

TRB S-56 Precision Lathe

Tomorrow's Lathe for Sale Today

Just as the S-56 (famous as the wartime's mobile shop and instrument lathe) was well ahead of its time, the new TRB S-56 is definitely a "lathe of tomorrow."

Added to its previous advantages . . . to the same rigid 56" bed, 4-speed V-belt drive with double V belts to spindle, its 1" collet capacity, 1⅜" hole through spindle, and modern 5-drawer steel bench are: a new heavier headstock with large tapered roller bearings and a higher speed range, and increased capacity for heavy work.

The new bearings are not just anti-friction but are "Zero Precision" — the absolutely finest taper roller bearings built.

This is more than incidental improvement . . . it means that every Sheldon TRB S-56 can do accurate precision work, at new high machining speed and maintain its extreme accuracy — can produce more and at a lower cost per piece.

Write for new TRB S-56 catalog sheet

From any angle this "tomorrow's lathe" is your best buy today.

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Arbor Presses • Vises
Sheldon Vernon Horizontal Milling Machines • Vertical Milling Machines and Jig Borers • Shapers

4229 N KNOX AVENUE • CHICAGO 41, ILLINOIS U.S.A.

Danly Die Sets and Die Makers' Supplies Speed Production

in the Die Shop

in the Press Room

Photo—Courtesy of Croname, Inc.

DANLY PRECISION DOWEL PINS are accurate through their entire length . . . Diamond tested for hardness (58-60 Rockwell-C) . . . Ground to a tolerance of .0001".

DANLY KNURLED SOCKET-HEAD CAP SCREWS save time and money. The mechanic can drive the knurled head a good part of the way before using the wrench. Infinite applications—a wide range of sizes.

DANLY KWIK-KLAMP TOGGLE CLAMPS combine strong construction and simplicity of operation—used wherever quick, positive clamping action is required.

DANLY DIE SPRINGS are noted for staying power and high resistance to fatigue. Two complete lines: *Medium Pressure—High Deflection; High Pressure—Medium Deflection.*

DANLY SOCKET-HEAD STRIPPER BOLTS. Made of high-grade steel, these stripper bolts have the same knurled socket-head found in Danly Cap Screws.

DANLY DIE SETS are famed for precision and known accuracy in Die Shops and Stamping Plants everywhere. Many types and sizes in Steel, and Semi-Steel.

DANLY *National Assembly*

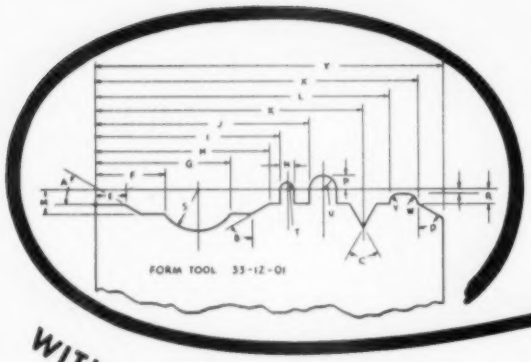
Call Danly

- **MILWAUKEE 2** — 111 East Wisconsin
- **DETROIT 16** — 1549 Temple Avenue
- **CLEVELAND 14** — 1550 East 33rd Street
- **DAYTON 2** — 990 East Monument
- **ROCHESTER 4** — 16 Commercial Street
- **PHILADELPHIA 44** — 18 W. Chelten Avenue
- **LONG ISLAND CITY 1** — 47-28 37th Street
- **DUCOMMUN METALS & SUPPLY CO.** — 4890 South Alameda, Los Angeles 54

DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue • Chicago 50, Illinois

Danly Tool, Die and Gage Makers' Supplies



SAVE TIME AND COMPUTATIONS

.. MEASURE TOOL CONTOURS DIRECTLY

WITH THE BAUSCH & LOMB

CONTOUR MEASURING PROJECTOR

IT PROJECTS a sharp, distinct, geometrically true, magnified silhouette of the object on a protractor screen where all angular measurements can be read to ± 1 minute of arc (1′)—an accuracy not attainable with any other projector. Direct linear measurements, reading to ±.0001″, may be made by means of the cross slide stage with its attachments.

Dimensions, angles, and profiles of production-run parts can be compared directly with a traced outline of the projected image of the master part, or with a large scale drawing superimposed on the screen. Defects are located quickly and simply.

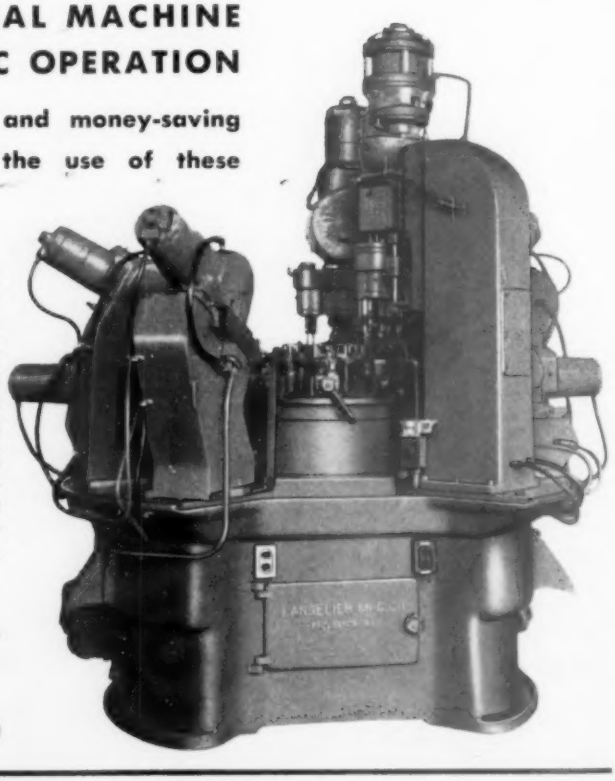
Write for Catalog D-27. Bausch & Lomb Optical Co., 763- E St. Paul Street, Rochester 2, New York.

BAUSCH & LOMB
OPTICAL COMPANY ROCHESTER 2, N.Y.

Eleven LANGELIER AUTOMATIC UNITS

. . . BUILT INTO THIS SPECIAL MACHINE FOR HIGH-SPEED AUTOMATIC OPERATION

— and it's typical of the many time- and money-saving possibilities that are YOURS through the use of these versatile metal-working Units!



Langelier Automatic Units are ideally suited to single or multiple applications in the building of Special Machines for high production drilling, tapping, milling, counterboring, reaming, spotting, chamfering, etc. Muliple Spindle attachable Langelier Heads may be mounted on the feed sleeve of each Unit for combinations of these operations. Machine shown at RIGHT has been arranged to perform a series of drilling, counterboring and tapping operations in Carburetor Bodies. Machine features nine Langelier Drilling Units and two Tapping Units. One drilling unit is equipped with four-spindle attachable head, and one tapping unit has eight-spindle attachable head. Eight-station dial indexing mechanism is motor-driven. Entire machine electrically interlocked for fully automatic operation. Our engineering department will gladly make recommendations for machines adapted to YOUR specific requirements.

LANGELIER MANUFACTURING CO.

Drilling and Swaging Specialists for
Over 50 Years . . . Incorporated 1887

PROVIDENCE • RHODE ISLAND

NEW MILL DEPOT FOR TOOL STEEL

Now in Operation

Located at the Bethlehem, Pa., plant, the new depot features large stocks of the standard tool steels in popular sizes.

GOOD NEWS FOR MILL CUSTOMERS

Bethlehem's new tool steel mill depot is now in operation, providing greatly improved service. Distributors and mill customers can rely on immediate shipments from large depot stocks of standard tool and die steels in popular sizes and shapes. Modern in every respect, the new facilities represent another step forward in Bethlehem's program to maintain a *complete* tool steel service.

For every job in your shop requiring tool or die steel, there is a Bethlehem grade that will give a good account of itself. Call us when tool steel problems get tough—or better still, let us work with you from the start.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Immediate Shipments

TOOL AND DIE STEELS

Carbon and Carbon-Vanadium Tool Steels
Oil-Hardening Die Steel (BTR)
High-Carbon, High-Chrome Die Steel (Lehigh H)

SHOCK-RESISTING AND GENERAL-PURPOSE TOOL STEELS

Omega and 67 Chisel

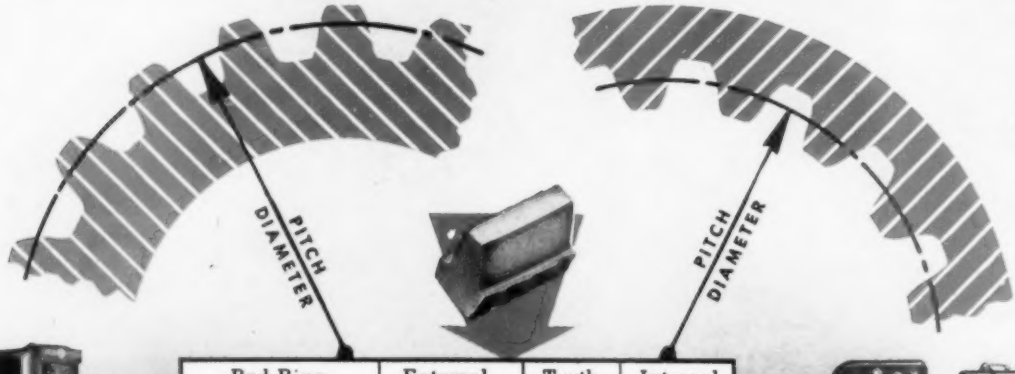
HIGH-SPEED STEELS

Bethlehem Special High Speed (BSHS)
66 High Speed

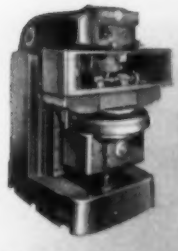
★ BETHLEHEM STEEL ★

BETHLEHEM TOOL STEELS for EVERY JOB

SPUR AND HELICAL GEARS ARE SHAVED AND CROWNED ON THESE RED RING MACHINES



Red Ring Machine Designation	External Gears Pitch Dia.	Teeth May Be Crowned	Internal Gears Pitch Dia.
GCL-3″	3/16″— 4″		
GCI-8″	1″— 8″	Yes	3″— 8″
GCI-12″	1″— 12″	Yes	3″—12″
GCI-18″	2¼″— 18″	Yes	3″—18″
GCP-24″	3″— 24″	Yes	
GCU-8″ Diagonal	1″— 8″	Yes	
GCU-12″ Diagonal	1″— 12″	Yes	
GCR-12″			3″—12″
GCJ-36″	4″— 36″	Yes	
GCM-36″	4″— 36″		
GCQ-36″ Standard	12″— 36″		12″—36″
GCQ-36″ Spec. Small	5″— 30″		5″—30″
GCQ-48″	22″— 48″		22″—48″
GCM-48″	4″— 48″		
GCK-96″	24″— 96″		
GCK-120″	48″—120″		



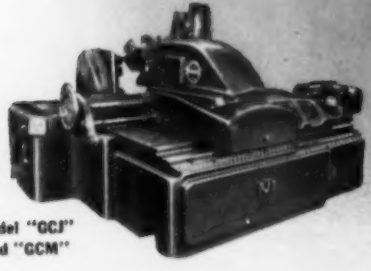
Model "GCU" Diagonal

Model "GCR" Internal

Model "GCL" Fine Pitch

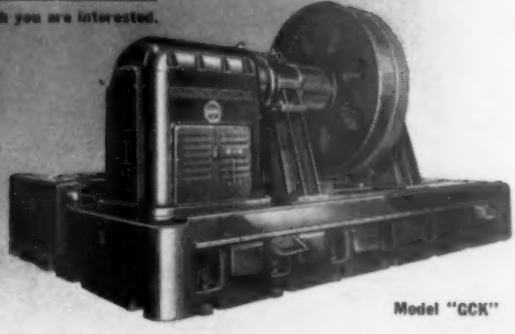
Model "GCQ"

Write for descriptive folder on the machines in which you are interested.



Model "GCJ" and "GCM"

Model "GCI" and "GCP"



Model "GCK"

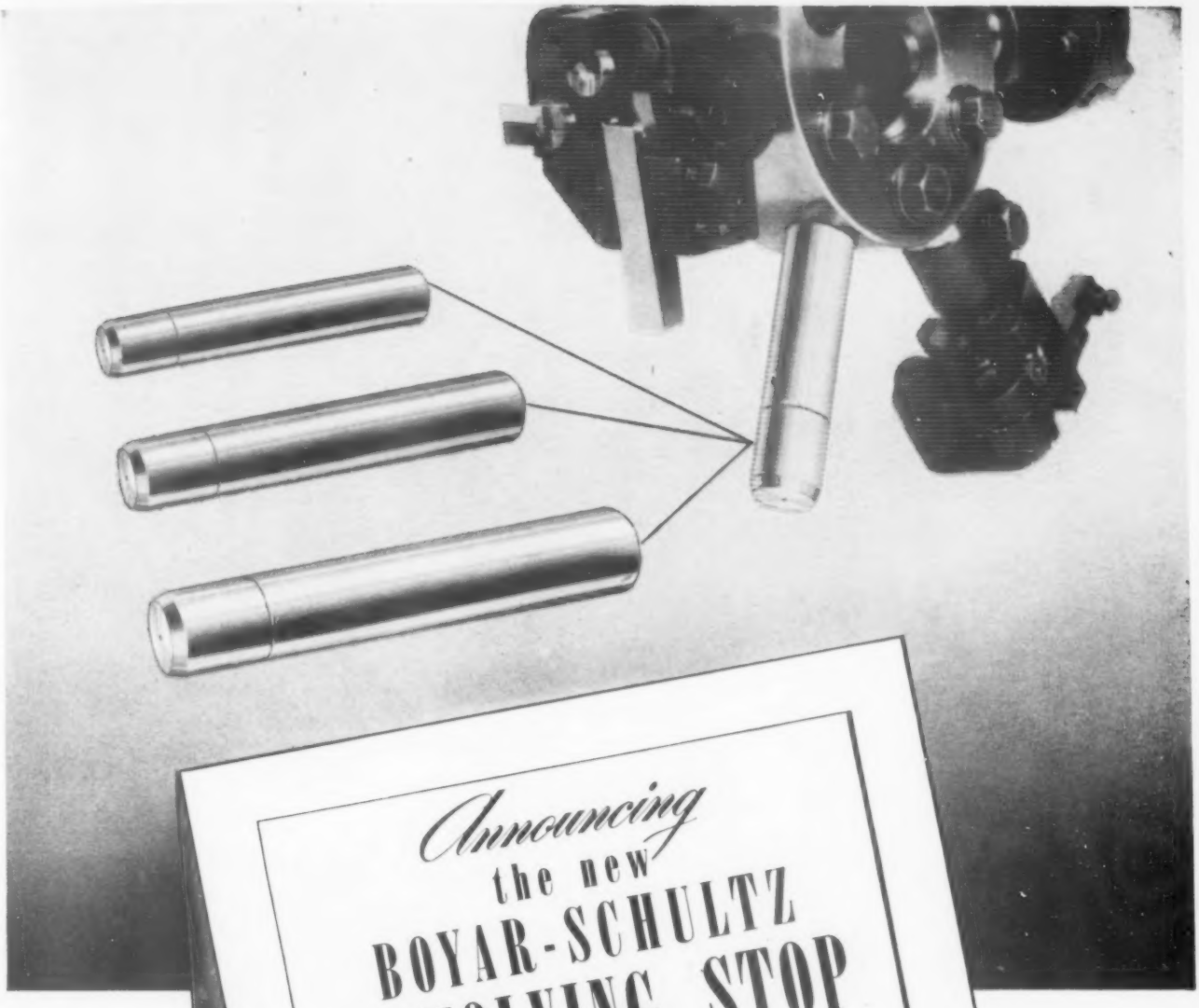
RED RING PRODUCTS

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

2526

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE • ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS



Announcing
the new
BOYAR-SCHULTZ REVOLVING STOP

● Tests have proved that it is no longer economical to make your own stock stops for screw machines It is real economy instead, to use the new Boyar-Schultz Revolving Stop.

This new Tool, with free turning live head, reduces friction between work and stop, preventing marring of piece parts.

Due to its design and precision manufacture it helps eliminate variation in piece-part lengths Its enclosed ball-bearing races prevent entrance of chips and foreign material, assuring long life, far greater than is expected from ordinary stops.

Its low price brings new economy into your screw machine operations.

WRITE FOR OUR NEW SCREW MACHINE TOOL CATALOG

BOYAR-SCHULTZ
CORPORATION

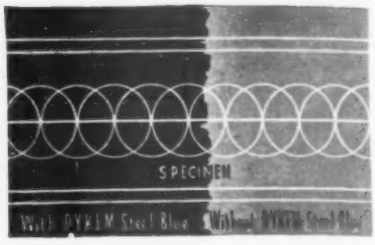
2109 WALNUT STREET
CHICAGO 12, ILLINOIS

● "Lundbye" flash-chrome surfaces by Racine are more wear-resistant due to the extreme hardness obtained (up to 1200 Brinell). Racine "Tri-Chrome" restores worn tools without regrinding or lapping. Salvages machine parts by controlled deposits of up to .001" thickness. Write today.

Racine Plating Company, Inc.
RACINE, WISCONSIN
HARD CHROMIUM, COPPER, NICKEL, BRIGHT CHROMIUM, CADMIUM, TIN PLATING • OXIDIZING • POLISHING • PICKLING

DYKEM STEEL BLUE

STOPS LOSSES
making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.
In Canada: 2466 Dundas St. West, Toronto, Ont.

DIAMONDS FOR WHEEL DRESSING TOOLS
DIAMONDS FOR THREAD GRINDING TOOLS
DIAMONDS FOR ALL INDUSTRIAL PURPOSES

KOEBEL

Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13

NOW! DIE SETS WITH INTERCHANGEABLE PARTS

By using special production tools and methods "Standard" has developed a *strictly interchangeable* die set, made entirely of steel. Die shoes and punch holders may now be interchanged or replaced without expensive re-work and fitting. This means long life and low cost tool maintenance since stock parts may be used for replacement and assembly.

"Standard" Steel Die Sets reduce idle machine time and soon pay for themselves by eliminating the costly routine of setting up the dies every time a job is repeated. Stocked in all regular catalog sizes.

Write for Catalog DS

STANDARD MACHINERY CO.
1585 ELMWOOD AVE., PROVIDENCE 7, R. I.

BRANCH WAREHOUSES:

CLEVELAND	DETROIT	MONTREAL	PHILADELPHIA	WORCESTER
The Die Supply Co.	Diemaker Supplies Co.	Bridge Machinery Co.	Fidelity Tool Supply	Lindco, Incorporated
5349 St. Clair Ave.	2679 E. Grand Blvd.	768 St. Paul St. W.	309 Vine St.	1023 Southbridge St.
EXpress 1133	TRinity 1-2865	LAncaster 0148	CAmden 4-7765	WOrcester 6-4637

OILGEAR *Pull-Down* BROACHING

Broaching 3 splines in 630 Bicycle Coaster Brake Hub Shells per hour on an Oilgear Type XP-30 x 54" machine. Operator merely loads 4 parts and depresses start buttons. Multiple tool handling and ejection of parts are automatic.

SAVES TIME AND LABOR by freeing both hands of operator for loading work . . . by handling tools automatically . . . by threading and accurately centralizing work automatically . . . by broaching at speeds coinciding with operator's ability to serve machine.

SOLVES FINISH, ACCURACY AND PRODUCTION PROBLEMS by positive, pressure lubrication and cooling of tools and work . . . by causing chips to quickly fall away from tools and cutting zone . . . by securing tools at both ends during major portion of cutting stroke . . . by eliminating possible tool sag . . . by multiple operations per cycle . . . by more parts per grind and longer tool life . . . by controlled, higher broaching and return speeds. Unloading can be automatic. Loading, broaching and unloading can be performed without an operator.

See 21 large illustrations of broaching diversified parts . . . the time, labor and power-saving design and operational features and complete specifications on 10 standard Oilgear Pull-Down Broaching Machines as published in our new 24 page Bulletin 25000. Send the convenient coupon below for a free copy today. THE OILGEAR COMPANY, 1308 W. Bruce Street, Milwaukee 4, Wis.

Oilgear

Fluid Power BROACHING MACHINES

OILGEAR

MAIL COUPON FOR NEW 24 PAGE BULLETIN

The Oilgear Company,
1308 W. Bruce St., Milwaukee 4, Wis.

Please send me a free copy of Bulletin 25000 on Pull-Down Broaching Machines.

*Name*_____ *Position*_____

*Company*_____

*Address*_____

WHERE HAVE YOU SEEN PRICES LIKE THESE?

Adjustable MULTIPLE SPINDLE DRILL HEAD

Adaptable to 14" x 17" Machines
6" Drilling Area

HEAD CAN BE FURNISHED WITH 3 TO 8 SPINDLES

1/4 CAPACITY
21/32 CENTERS

PRICES

3	Spindle	Head	$150.00	6	Spindle	Head	$170.00
4	"	"	155.00	7	"	"	180.00
5	"	"	160.00	8	"	"	200.00

US HEADS SINCE 1915

• *Delivery in Two Weeks*

UNITED STATES DRILL HEAD CO.
CINCINNATI 4, OHIO

STANDARDIZATION PLUS VERSATILITY

Operation—Punch previously drilled holes before broaching.
Part—Sliding gears.
Machine—Punch press.

This setup, designed and built by Q-C, handles 8 gears having different tooth spacing. Only four minutes to change over. Full details upon request.

When you incorporate "Q-C" units in your designs, you secure full advantages of standardization without limitations—only the "Q-C" method affords this important factor.

"Q-C" STANDARDIZED UNITS

JIGS AND FIXTURES • MILLING FIXTURES
FIXTURE LOCKS • FIXTURE UNITS
ROTARY AND RECTANGULAR TABLES
LOCATING PINS AND REST BUTTONS, ETC.

No tool designer should be without the 80-page "Q-C" Tool Engineers' Reference and Standard book. Yours for the asking.

"TO STANDARDIZE is to ECONOMIZE"

Q-C ENGINEERING PRODUCTS

2842 W. GRAND BLVD. DETROIT (2) MICH.

Production Tooling Engineers Since 1926

Here's a Challenge!

IF YOU USE TOOLS AND DIES
OUR ENGINEERS CAN SAVE YOU MONEY

CUT MATERIAL COSTS • SAVE MAN-HOURS • MINIMIZE PRODUCTION DELAYS

with

TOOL-ARC
EXTRUDED TOOL-STEEL
ELECTRODES

Damaged hot trimmer die section.

A "Good As New" die repaired with *Tool-Arc*.

Repairing and rebuilding tools and dies with Alloy Rods Company's *Tool-Arc*, tool-steel electrodes, is like buying a new tool or die . . . only you save instead of spending.

Tool-Arc electrodes are available in six basic types, all extruded to assure absolute uniform welding. The weld deposit has characteristics typical of each type of tool and die steel...they may be annealed, reheat-treated, drawn or tempered the same as any tool-steel in its classification.

SIX BASIC TYPES OF TOOL-ARC TOOL-STEEL ELECTRODES

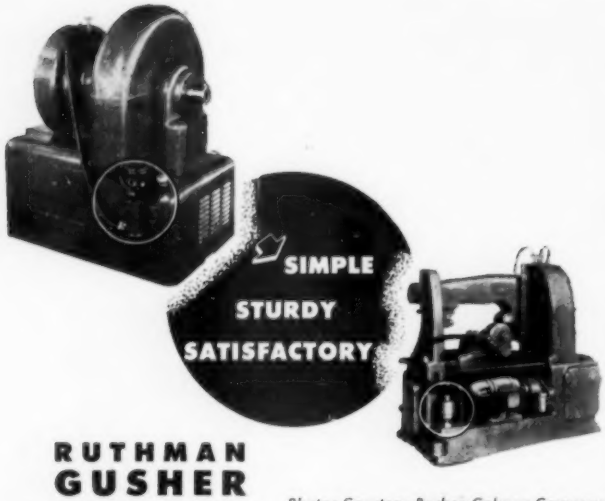
★ HIGH-SPEED	★ WORK-HARDENING	★ HOT-WORK
★ AIR-HARDENING	★ OIL-HARDENING	★ WATER-HARDENING

Accept Our Challenge

If you use tools or dies, write for our engineers' recommendations to save you money. Write today.

ALLOY RODS CO.

YORK • PENNSYLVANIA



RUTHMAN GUSHER
COOLANT PUMPS

Photos Courtesy Barber-Colman Company Rockford, Illinois

The Etna Machine Company Toledo, Ohio

Simple—Sturdy—Satisfactory

Simply designed, with fewer moving parts, Ruthman Gusher Coolant Pumps are quickly and easily installed. Their overall sturdy construction assures you long trouble-free life and satisfactory service under every plant condition. Remember there's a type and size to meet any coolant requirement.

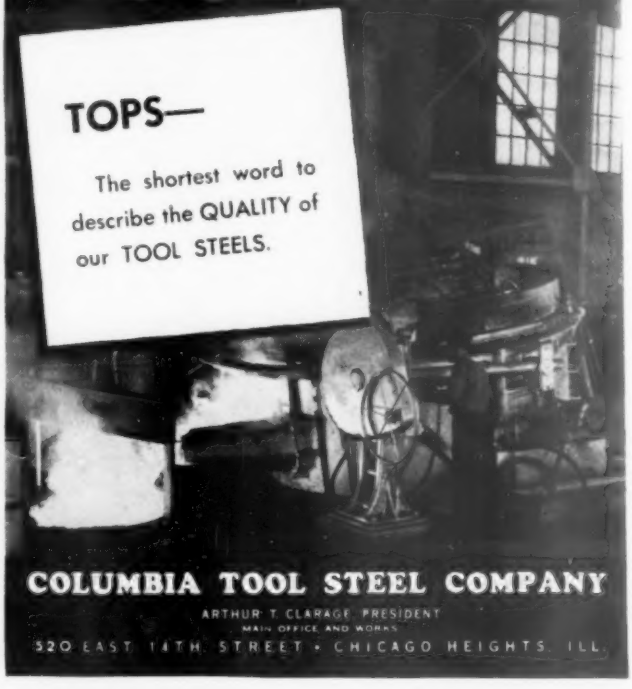
Illustrated at the left above is a 1/10 H.P. Model 4 P-3 Gusher Coolant Pump on an Etna No. 150 Swaging Machine. Below is a Model 11021 Long Gusher Coolant Pump on a Barber Colman Type "D" Hobbing Machine.

Write for Catalog 10-1

Model 11020

THE RUTHMAN MACHINERY CO.
1810 Reading Road Cincinnati, Ohio

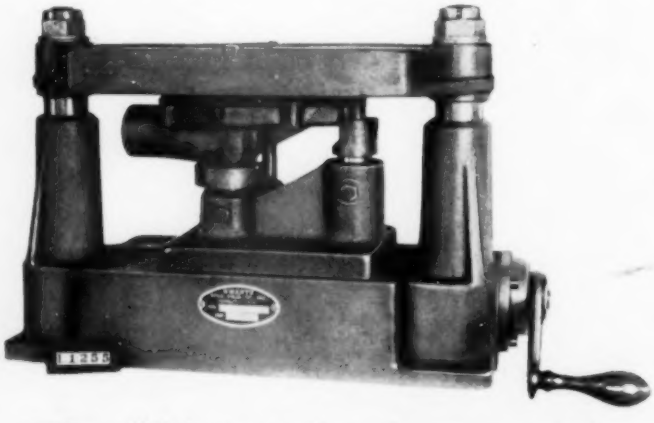
Columbia TOOL STEEL



TOPS—

The shortest word to describe the QUALITY of our TOOL STEELS.

COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE, PRESIDENT
MAIN OFFICE AND WORKS
520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.



Drilling all holes in joint face of water pump body.
Clamping bushing plate squares up joint face.

DESIGNERS

BUILDERS

ALL TYPES OF SHOP PRODUCTION TOOLS

STANDARD FIXTURES AND FIXTURE LOCKS

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley — ASK FOR CATALOG 941 — Detroit 27, Michigan

Represented by

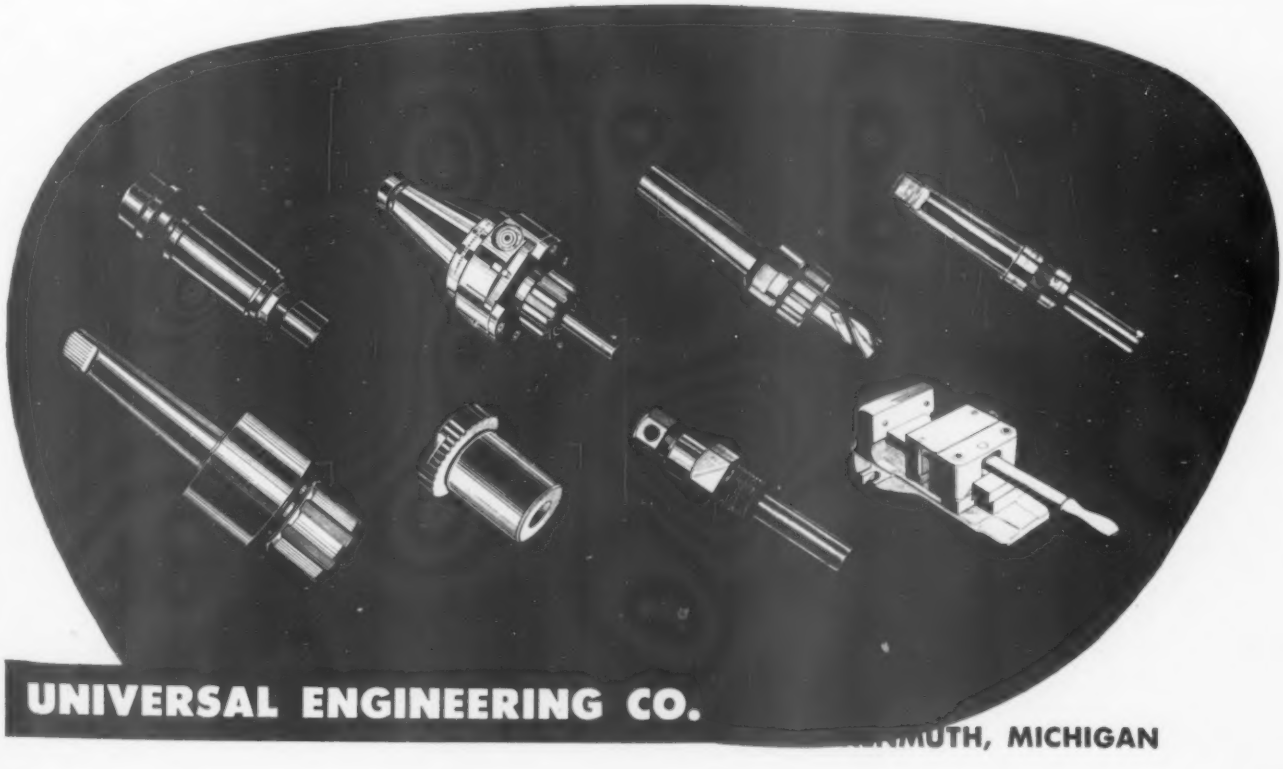
Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
Houston—Engineering Sales Co.
Los Angeles—Production Tool Engineering
Boston—A. R. Shevlin Co.
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

YOU GET ALL 3 IN UNIVERSAL DRILL BUSHINGS

Drills, taps, and reamers run straight and true when they are guided to the work through Universal Drill Bushings. Superhoned bores are precisely finished. They offer unexcelled resistance to the wear and galling action of chips. They speed accurate production and at the same time reduce costly drill breakage. Universal Drill Bushings are available in a wide variety of special and standard types and sizes.

Order from the Universal Engineering Sales Co. warehouse nearest you—89 Main St., Ansonia, Conn., or 5629 Sixth St., Kenosha, Wisc.—or direct from our main plant.

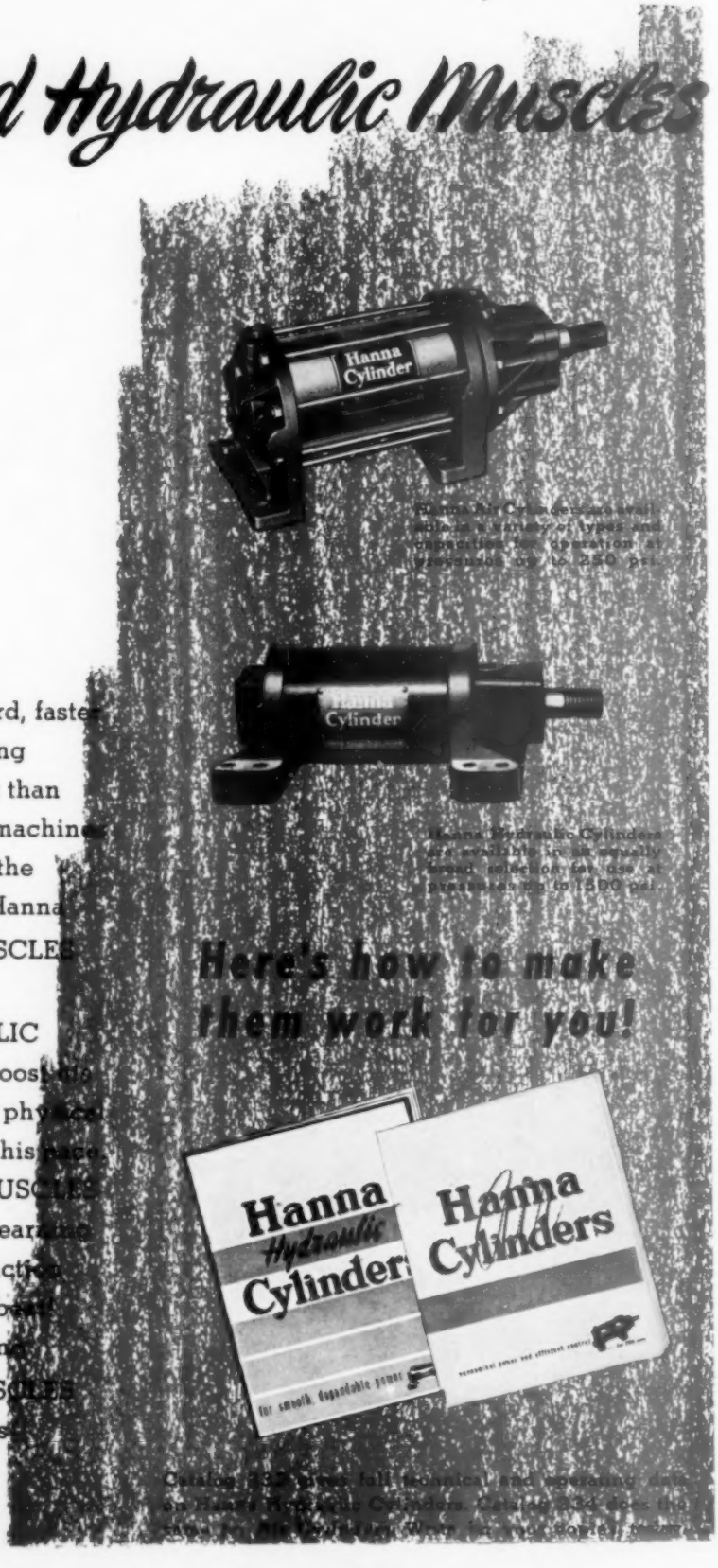
We will be pleased to send literature describing Universal tools upon request.



UNIVERSAL ENGINEERING CO.

...NMUTH, MICHIGAN

Pneumatic and Hydraulic Muscles



With production costs spiralling upward, faster and more efficient methods of handling materials and parts are more important than ever before. Modern high production machines must be used to their full capacities if the maximum benefits are to be realized. Hanna PNEUMATIC AND HYDRAULIC MUSCLES can help you accomplish this.

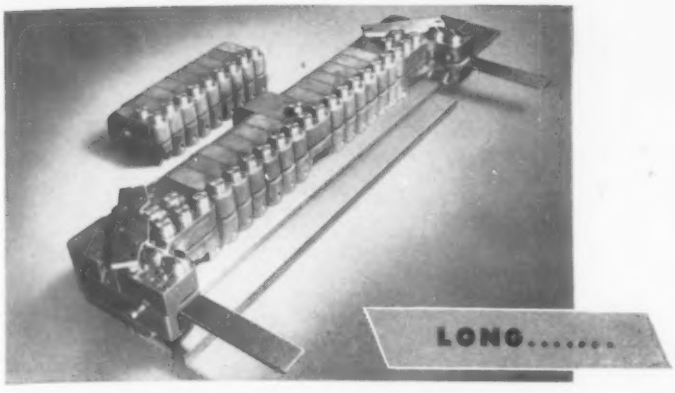
With PNEUMATIC AND HYDRAULIC MUSCLES the machine operator will boost his output without any increase in his own physical exertion. He does not need to quicken his pace. He works at a normal rate and these MUSCLES do the rest. The operator increases his earning power and management reduces production costs. It's a combination that's hard to beat!

Investigate the possibilities in putting PNEUMATIC AND HYDRAULIC MUSCLES to work for you. Send for the catalogs described at the right.

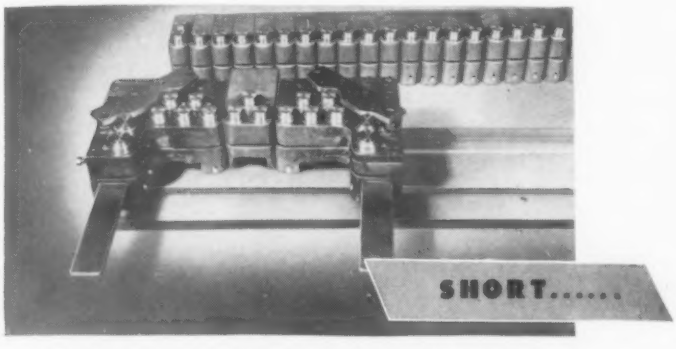
Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

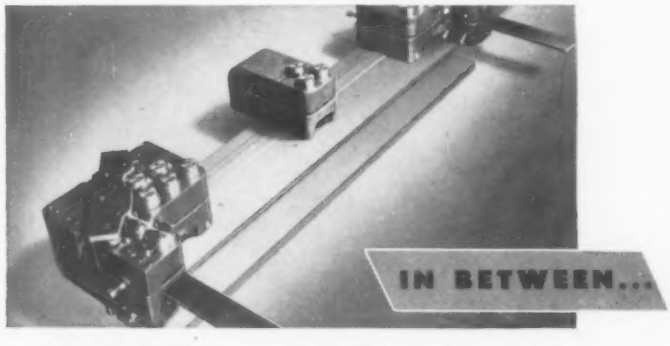
1765 Elston Avenue, Chicago 22, Illinois



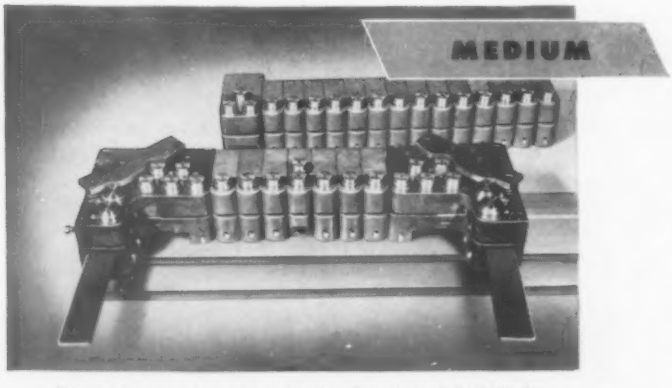
Showing a relatively long setup of Wales Equipment. The "in-between" Units are held in position by the two end Units that are locked to the rail. "Stand-by" Units are shown in background.



Showing the end Units moved together to hold one "in-between" Unit. This is a relatively short setup.



Showing the same group of three Units as above setup for punching at longer center-to-centers.



Showing setup of medium length. The "stand by" Units in the background may instantly replace the Units in setup or may be added for longer setups. Only the two end Units are locked in position,—the "in-between" Units are simply set on the rail.

THE LONG AND SHORT OF IT WITH WALES

HOLE PUNCHING AND NOTCHING EQUIPMENT

Only Wales Patented Hole-Punching and Notching Equipment provides these economies of time and money shown at left.

These setups were used for punching various lengths of shelving with varying hole centers for adjustments of shelf spacings,—at the same time notching the corners. The flexibility of setups required to meet the unlimited number of hole-punching and notching requirements is made possible by two Wales exclusive and patented advantages:—

1. A mounting rail that permits the Wales Units to be placed, replaced, and quickly slid into exact position for each setup.
2. Wales self-contained, independent Hole-Punching and Notching Equipment eliminates any adjustments between punches and dies,—just set Units on rail according to pattern and start operating.

NOTHING CAN BE SIMPLER than sliding the end Notching Units apart, placing the required number of Units in position on the bed rail, then sliding the end Notching Units together against the "in-between" Units. The Notching Units are locked to the rail and hold the other Units in position.

All the Units except the two on the ends may be added or lifted out of the setup without loosening or tightening any screws or clamps. It's tooling simplicity at its ultimate.

IT'S TOO BIG A STORY TO TELL ON THIS PAGE BECAUSE THIS IS ONLY ONE OF THE INNUMERABLE APPLICATIONS OF WALES EQUIPMENT, SO WRITE FOR FULLY-ILLUSTRATED, FUNCTIONALLY-COLORED CATALOGS TODAY.

WALES-STRIPPIT CORPORATION

George F. Wales, *President*

393 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

Wales-Strippit of Canada Ltd., Hamilton, Ont.

Specialists in Punching and Notching Equipment

"we proved our ability to be of service . . ."

says W. H. Hoelster

STUART OIL COMPANY REPRESENTATIVE

Stuart Oil Performance Report on ThredKut 61

Type of Product manufactured by company covered in this report:
Machined parts from rough forgings

Personnel interviewed:
Machine Shop Supt. and General Foreman

Stuart Oil Products used in this plant:
Threadkut 61, Solvol

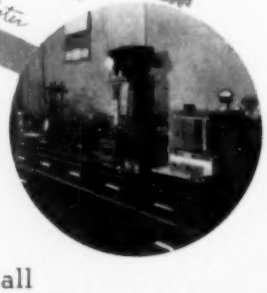
Specific operations covered by this report:
Drilling and boring forged "Shaw" steel pump liners

Performance details:
"Problem was presented here in boring 7" dia. holes through 11" dia. x 30" solid forged pump liners running about 170 Br. Liners are run on two heavy duty lathes, one starting with a 1" dia. drill followed with a boring bar; the other a heavy boring bar used for removing entire 7/8" of stock.

5000 steel and surfacing will on 4615 steel, but when Solvol was substituted, they could barely get 1 to 1½ liners per day, from one lathe. Switching to Threadkut, tool life improved, but still only not one liner per tool grind, plus terrific vibration.

"When they called us in on the trouble. Our immediate diagnosis indicated dilution was in order. A 6-1 blend of Threadkut and Fire, was decided upon...and it fixed the job...they now turn out 35 liners per day per lathe, meeting production schedules...and are very appreciative of our help in solving this problem."

W. H. Hoelster



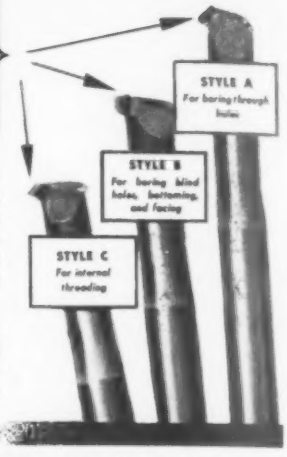
HERE is another case where Stuart engineering service played an important part in solving a tough cutting problem. No "panacea" for all metal-working ills, Stuart Oil products must be used correctly to meet specific requirements. In this instance, the *right* oil was being used, but without necessary dilution. Our background and experience in helping to solve scores of similar problems is available to assist *you* in analyzing cutting fluid requirements. Write for further information.

Illustrated is one section of the completely equipped Stuart Metallurgical Laboratory, where the "Straight Line to Metal-Working Efficiency" begins.

D.A. Stuart Oil CO.
EST. 1869 LIMITED
2727-49 So. TROY STREET, CHICAGO 23, ILL.

STUART *service goes with every barrel*

YOU RESHARPEN ONLY ONE FACE OF BOKUM TOOLS

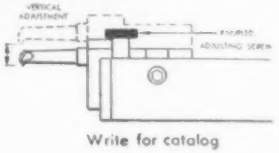


Thus the original form of these boring and internal threading tools is never changed. The angle of the cutting edge and the special helical backed-off form of the front of the tool (A and B) produce a free cutting action that is constantly retained—even through resharpening.

Send for folders that show complete range of sizes. Choose the tool you require and try it on your machines. See how much faster and more economical Bokum Tools perform. *Send for Cat. N-1139 for high speed tools; N-398 for carbide tipped tools.*

THIS NEW HOLDER GIVES YOU VERTICAL ADJUSTMENT

A simple turn of knurled screw on top of holder moves tool in vertical plane to give the precision setting you want. Rocker of tool post can be left out and shims are not needed. Here is a worthy advancement in boring tool holders. Two sizes: BT-0 shank size, 3/8" x 1"; BT-1 shank size, 1/2" x 1 1/4"

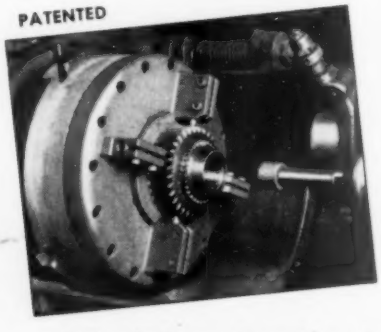


Write for catalog

BOKUM TOOL CO.
TRADE MARK REG. U. S. PAT. OFF.
14775 WILDEMERE AVE. · DETROIT 21, MICH.
SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

DIAPHRAGM CHUCKS

PATENTED



Look, a high speed, precision chuck with no parts to wear out! *Result*: Maximum accuracy, minimum maintenance! *Because* the Woodworth design assures the ultimate in concentric chucking. *Obviously*, it will solve your precision chucking problems, as it has already for large manufacturers of gears and other production parts. Send your precision chucking problems to us—at no obligation.

MECHANICALLY OR AIR OPERATED

ACCURACY YOU CAN TRUST

WOODWORTH
N. A. WOODWORTH CO., • SALES DIVISION
1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

Bryant

SQUARENESS OF FACE

Gages

fast - positive - visual

There is no longer any need for slow, expensive methods for determining thread accuracy and the important relationship between the pitch diameter of the thread and the face of the part. With the Bryant Squareness of Face Gage, the necessity for "feel for fit" is also eliminated, because this gage is *positive* and *visual*. It is 5 to 10 times *faster* than conventional methods. Operation of the gage is simple—acceptability of the thread is determined by placing the part on the gage and giving it one-third of a turn. The dial indicator shows exact comparison of the thread with the master setting ring. The Squareness of Face Gage is then swung into position. Another half turn visually shows the right angularity of the face with the pitch diameter of the thread.

The Squareness of Face Gage may be mounted on any Bryant Thread Gage. It consists of a movable arm which carries a large dial indicator and two contact points. These contacts are adjustable to cover the capacity of the thread gage. The inner contact serves as a pilot, and compensates for thread progression as the part is turned.

If you are interested in saving money on the multiple chucking of threaded parts, it will pay to write for details on the complete Bryant Gage line.

BRYANT

Also Bench Model Thread Gages, Universal Diameter Gages, Adjustable External Thread Gages and Portable Thread Gages

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

TOOLS for PRECISION PRODUCTION

INDESTRUCTIBLE!

NUPLA MALLETS

A Mallet for Every Purpose and a Purpose for Every Mallet.

• NO MARRING • NO CHIPPING • NO REBOUND
• NON-INFLAMMABLE • HARD-HITTING

STANDARD (ALL PURPOSE)				HEAVY DUTY			
No.	Head Dia.	Head Length Overall	Approx. Weight	No.	Head Dia.	Head Length Overall	Approx. Weight
50	1"	3⅜"	5 oz.	57	1⅞"	4⅜"	2 lbs.
51	1"	3⅜"	8 oz.	58	1⅞"	5¼"	1¼ lbs.
52	1⅜"	4"	8 oz.	59	1⅞"	5¼"	1½ lbs.
53	1⅜"	4"	17 oz.	60	1⅞"	5¼"	3 lbs.
54	1⅞"	4⅜"	15 oz.	61	2⅜"	5¼"	1¾ lbs.
55	1⅞"	4⅜"	24 oz.	62	2⅜"	5¼"	3 lbs.
56	1⅞"	4⅜"	32 oz.	63	2⅜"	5¾"	4 lbs.
				64*	3"	6¼"	3 lbs.
				65*	3"	6¼"	6 lbs.

*No. 64 and 65 have removable tips

Available in: SOFT (Type XX); MEDIUM (Type A); HARD (Type B)

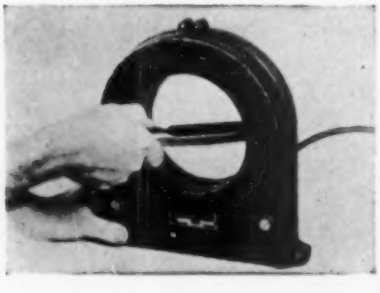
—The Modern Way to Mark Tools and Parts!

ELECTRIC ETCHERS

Write on steel with electricity. This is a quality tool noted for its smooth etching action. Will stand up under rough shop use. Weighs only 22 lbs. Overall case dimensions—4¼" x 8" x 10". Standard 6-ft. cord and plug for operations from 110-volt 60-cycle A.C. current. Complete with new, patented offset stylus.

Clinging Particles Mean Dull Equipment!

DEMAGNETIZERS



With this 6" "Through Type" Demagnetizer, merely pass the work or tool through the opening and remove to a distance of one or two feet before turning off the current. To speed up production, work may be dropped through by gravity. Operates from regular power lines. No moving parts. Other standard sizes from 4" x 24" to 18" x 24".

•

PRECISION PRODUCTION TOOLS

PROMPT DELIVERY
Write for Literature

ACME TOOL COMPANY

96 WARREN STREET • NEW YORK 7, N. Y.

ARMSTRONG

TOOL HOLDERS AND TOOLS

STANDARD WHEREVER METAL IS MACHINED

Over 96% of the machine shops and tool rooms use ARMSTRONG TOOL HOLDERS, because each is a permanent, multi-purpose tool that does the work of a complete set of forged tools. Each is a stronger, more efficient tool that takes cutter bits quickly ground from stock shapes of high speed steel, thus "Saves All Forging, 70% Grinding and 90% High Speed Steel."

With the correct ARMSTRONG TOOL HOLDERS for each operation you will be permanently tooled-up for every operation on lathes, planers, slotters and shapers. They are sold by all leading industrial distributors.

Write for Catalog

Armstrong Bros. Tool Co.

"The Tool Holder People"

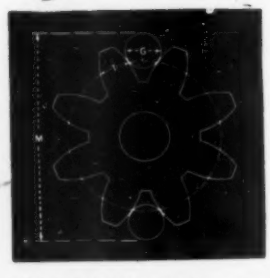
357 N. Francisco Ave.

Chicago 12, U. S. A.

THE *Van Keuren*

simplified

GEAR MEASURING SYSTEM



is the most accurate and economical method of measuring tooth thickness of external and internal spur gears. Also it may be applied to helical gears.

◀ *External Spur Gear*

STANDARD SIZES OF WIRES ARE AVAILABE FROM STOCK

1.728"/DP	for external spurs
1.44"/DP	for internal spurs and 30° splines
1.92"/DP	for enlarged pinions and 30° splines
1.68"/DP	tentative alternate series

ULTIMATE ACCURACY ★

Catalog No. 33 is a manual of precision measuring systems, giving complete tables and simplified formulas for measuring standard and special threads, splines, spur gears, helical gears and worms. Send for Catalog 33.

★

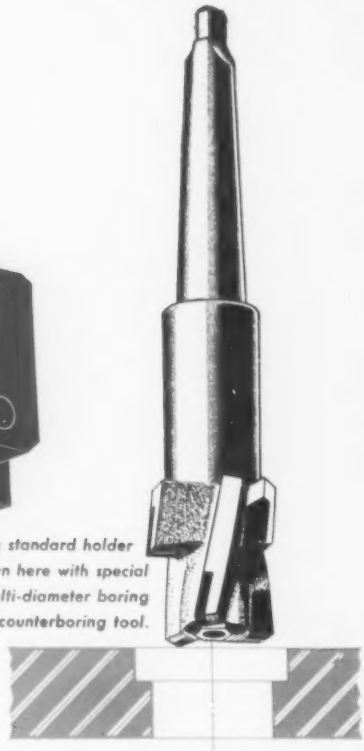
THE *Van Keuren* CO., 174 Waltham St., Watertown, Mass.

28th YEAR

Light Wave Equipment • Light Wave Micrometers • Gauge Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Measuring Wires • Carboloy Plug Gages.

Special boring, counterboring, and facing tool.

All tools shown on this page are reduced to about 2/5.



Gairing standard holder shown here with special multi-diameter boring and counterboring tool.

Regardless of Size...

Gairing standard holder with standard ¼" counterbore and pilot, and with standard ½" countersink.

The large Facing, Boring and Counterboring tool, measuring 13½ inches in diameter by 23 inches long, is one (but by far not the largest) of those tools especially engineered and built by GAIRING to suit the specific requirements of your production jobs. We will gladly cooperate with you in working out the most advantageous application of end cutting tools to your product.

The quarter-inch interchangeable counterbore and the countersink shown at the extreme left, are among the smallest of GAIRING'S complete line of standard tools. A great number of manufacturers have standardized on them, and you too can do so at a saving. Outline your needs and we will send descriptive literature. Or, should your requirements be unusual, our Engineering Department will give your problem the benefit of their wide experience.

Regardless of size . . . GAIRING will furnish the end cutting tools to do your job economically and well.

THE GAIRING TOOL COMPANY

DETROIT 32, MICHIGAN

GAIRING TOOLS

Index of Tool Engineer Advertisers

May 1947

A

Ace Drill Corporation 123
Witte & Burden
Acme Industrial Company 106
Edward C. Kennedy
Acme Tool Company 148
Lipsett Advertising Agency
Allegheny Ludlum Steel Corp. 129
Walker & Downing
Allen Manufacturing Co. 106
Norris L. Bull, Advertising
Alloy Rods Company 141
J. G. Kuester & Associates
American Chain & Cable Co., Andrew C. Campbell Division 79
Reincke, Meyer & Finn, Inc.
B. C. Ames Company 122
Henry A. Loudon—Advertising
Ampco Metal, Inc. 98
Hoffman & York, Inc.
Andersons, Inc. 130
C. W. Munger
Armstrong Bros. Tool Co. 148
Ross Llewellyn, Inc.

B

Baird Machine Company 124
Bausch & Lomb Optical Co. 134
Ed Wolff & Associates
Bay State Abrasive Products Co. 121
Howard-Wesson Co.
Bay State Tap & Die Co. 94
Hammond-Goff Co.
Behr-Manning Corp. 84
Hevenor Advertising Agency, Inc.
Chas. H. Besly & Co. 81
Evans Associates Co.
Bethlehem Steel Company 135
Jones & Brakeley, Inc.
Bokum Tool Company 146
Charles M. Gray & Associates
Boyar-Schultz Corp. 137
C. W. Munger
Bristol Machine Tool Co. 80
Brown & Sharpe Mfg. Co. 115
Horton-Noyes Company
Bryant Chucking Grinder Co. 147
Henry A. Loudon—Advertising

C

Carboloy Company, Inc. 102
Carborundum Company ..... 77, 82 & 83
Comstock, Duffes & Co.
Casco Products Corp. 122
Grey Advertising Agency, Inc.
Cleveland Twist Drill Co. 103
Belden & Hickox
Columbia Tool Steel Co. 142
R. J. Skala Co.
Crobalt, Inc. 14
Charles Schweim Company
Curtis Universal Joint Co., Inc. 122
duPont & Cahalin, Inc.
Cushman Chuck Co. 114
Edward W. Robotham & Co.

D

Danly Machine Specialties, Inc. 133
Behel & Waldie & Briggs, Inc.
Detroit Reamer & Tool Co. 101
Dudgeon, Taylor & Bruske, Inc.
Dykem Company 138

E

Economy Tool & Machine Co. 124
Elgin National Watch Co. 76
J. Walter Thompson Co.
Engineering Products Co. 104
Ross Sawyer Advertising

F

A. B. Farquhar Co. 119
J. G. Kuester & Associates
Ford Motor Company, Johansson Gage Division 106
J. Walter Thompson Co.
Fray Machine Tool Co. 94
Joseph Maxfield Company

G

Gairing Tool Company 149
R. Marshall—Advertising
Gallmeyer & Livingston Co. 116
Wesley Aves & Associates
Gammons-Hoaglund Co. 104
Gisholt Machine Company 15
The Buchen Company
Greenfield Tap & Die Corp. 90
Channing L. Bete Co.
Grob Brothers 124

H

Hanna Engineering Works 144
Russell T. Gray, Inc.
Hannifin Corporation 2
Edwin H. Verrall
Hardinge Brothers, Inc. 3
Taylor Ward, Inc.
Heald Machine Co. 100
Rickard & Company, Inc.
Helo-Krome Screw Corp. 152
R. H. Young & Associates

I

Ingersoll Milling Machine Co. 99
Cummings, Brand & McPherson
International Nickel Co. 109
Marschalk & Pratt Co.

K

Kaufman Manufacturing Co. 120
R. C. Breth, Inc.
Kennametal, Inc. 131
W. S. Hill Company
Koebel Diamond Tool Co. 138
Holden-Clifford-Flint, Inc.

L

Landis Machine Company 10
Langsdale—Advertising
Langelier Manufacturing Co. 134
Lavallee & Ide 96
Wm. B. Remington, Inc.
H. Leach Machinery Co. ..... 94 & 130
Joseph Maxfield Co.
Lincoln Electric Co. 75
Griswold-Eshleman Co.

M

Merz Engineering Co. 96
Caldwell-Baker Co., Inc.
Metal Carbides Corp. 112
Meek and Thomas, Inc.
Midvale Company 78
Lewis & Gilman, Inc.
Morse Twist Drill & Machine Co. ..... 6 & 7
Sutherland-Abbott

N

National Broach & Machine Co. 136
Witte & Burden
National Tool Company 117
William Ganson Rose, Inc.
National Twist Drill & Tool Co. 111
Holden-Clifford-Flint, Inc.
Norton Company 95
John W. Odlin Co., Inc.

O

Oilgear Company 139
Kirkgasser-Drew

P

Pioneer Engineering & Mfg. Co. 92
St. Claire Advertising Agency
Pope Machinery Corp. 85
Walter B. Snow & Staff, Inc.
Potter & Johnston Machine Co. 97
Pratt & Whitney ..... Inside Front Cover
Wm. B. Remington, Inc.

Q

Q-C Engineering Products 140
Dudgeon, Taylor & Bruske, Inc.

R

Racine Plating Co. 138
Western Advertising Agency
Racine Tool & Machine Co. 86
The L. W. Ramsey Co.
Ready Tool Company 132
Edward W. Robotham & Co.
Reed Rolled Thread Die Co. 130
Lewis Advertising Agency
Robbins Engineering Co. ..... Back Cover
Charles M. Gray & Associates
Ruthman Machinery Co. 142
Bunker & Sullivan, Inc.

S

Screw Machine Tool Co. 91
St. Claire Advertising Agency
Sheffield Corporation ..... Inside Back Cover
Witte & Burden
Sheldon Machine Co., Inc. 132
Ross Llewellyn, Inc.
Sidney Machine Tool Co. 113
Simonds Saw & Steel Co. 105
Sutherland-Abbott
Snyder Tool & Engineering Co. 88
Wolfe-Jickling-Dow & Conkey, Inc.
South Bend Lathe Works 118
Lamport, Fox, Prell & Dolk, Inc.
Standard Gage Co., Inc. 5
Hevenor Advertising Agency, Inc.
Standard Machinery Co. 138
Hammond-Goff Co.
Staples Tool Company 107
The Keelor & Stites Co.
L. S. Starrett Co. 13
Walter B. Snow & Staff, Inc.
Steinle Machine Company 8
Stokerunit Corporation 108
Strong, Carlisle & Hammond Co. 120
Fuller & Smith & Ross, Inc.
D. A. Stuart Oil Co., Ltd. 146
Russell T. Gray, Inc.
Super Tool Company 16
Wolfe-Jickling-Dow & Conkey, Inc.
Swartz Tool Products Co., Inc. 142

T

Thompson Grinder Company 73
Emerson H. Mook, Inc.
Tungsten Electric Corp. 89
Thoma & Gill

U

United States Drill Head Co. 140
The Keelor & Stites Co.
Universal Engineering Co. 143
Seemann & Peters, Inc.

V

Van Keuren Company 148
Vascoloy-Ramet Corp. 87
Industrial Advertising Associates
Vickers, Inc. 151
Witte & Burden
Vulcan Tool Co. 9
Chester C. Moreland Co.

W

Wales-Strippit Corp. 145
Horace A. Laney, Advertising
Walker-Turner Company, Inc. 93
W. L. Towne
War Assets Administration ..... 125, 126, 127 & 128
Fuller & Smith & Ross, Inc.
Wendt-Sonis Co. 92
The L. W. Ramsey Advertising Agency
S. B. Whistler & Sons, Inc. 12
Comstock, Duffes & Co.
Wilson Mechanical Instrument Co. 120
Reincke, Meyer & Finn, Inc.
Winter Brothers Co. 110
Holden-Clifford-Flint, Inc.
Wood & Spencer Co. 104
Scheel Advertising Agency
N. A. Woodworth Co. ..... 11 & 146
A. R. Gloster
C. F. Worfolk 76

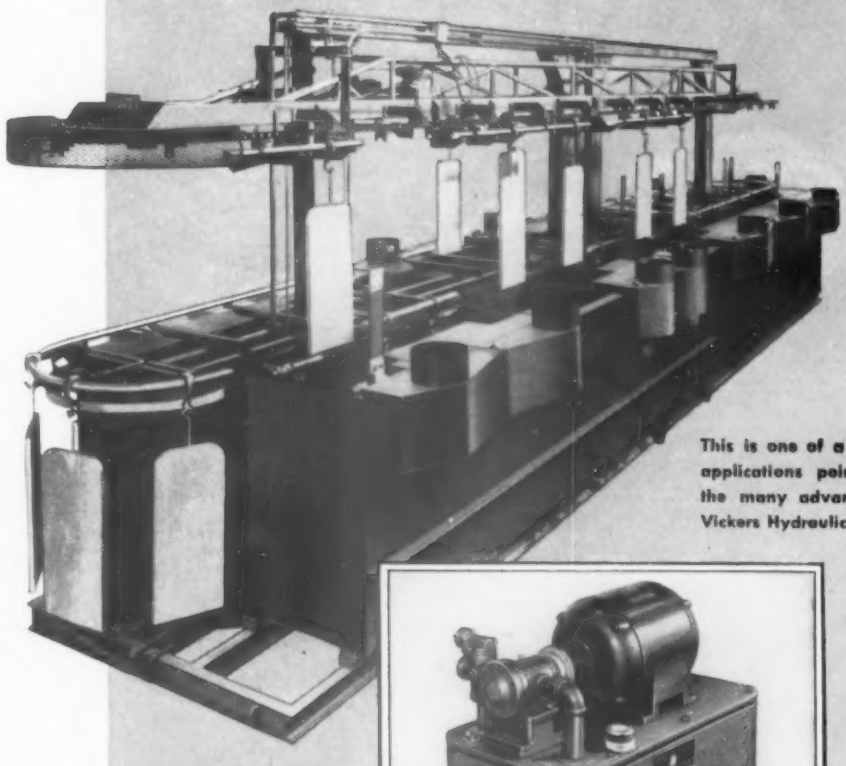
Z

W. M. Ziegler Tool Co. 94
Dudgeon, Taylor & Bruske, Inc.

VICKERS helps achieve HYDRAULIC EQUIPMENT

HIGH PRODUCTION
SPACE ECONOMY
UNIFORM QUALITY

IN *Udylite* AUTOMATIC PLATING MACHINE



This is one of a series of applications pointing out the many advantages of Vickers Hydraulic Controls.

Above: Elevated position for transfer from one tank to the next.

Vickers Hydraulic Power Unit.

This Udylite machine does a complete plating job automatically . . . taking each part through seven tanks and a drying chamber . . . timing exactly the interval in the various solutions for cleaning, plating and rinsing.

Each part (or rack of parts) is automatically lowered into each of the seven tanks in turn—then lifted out and transferred to the next tank. This might be done with a multiple dip conveyor. But the conveyor slants permissible in lowering and raising in that way require extra tank length.

Udylite made the machine far more compact—saving 18″ to 24″ in the length of each tank—by using Vickers Hydraulic Equipment to raise and lower the entire conveyor assembly at each transfer. By this means, each piece (or rack) is lifted straight out of the tank, moved over the next tank and lowered straight down. This provides better cleaning and more uniform plating—better drainage and less contamination of the solutions.

The Vickers Hydraulic Power Unit and Control Valves have many advantages for such applications: (1) proven dependability, (2) accurate control and precise timing, (3) flexibility of control to suit varied production requirements, etc.

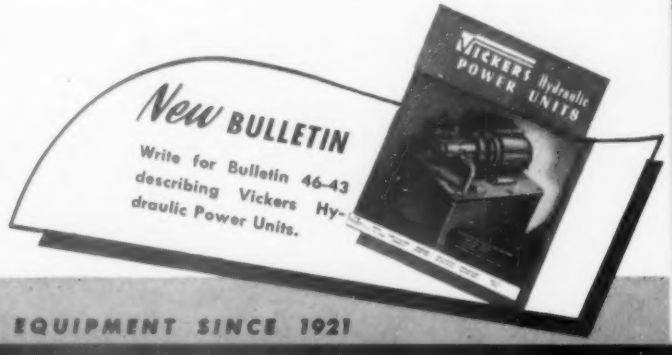
The versatile features of Vickers Hydraulic Equipment on this type of application, as on many other industrial installations, have made possible increased production, improved product quality, greater safety, and lessened physical demands upon labor while increasing its productivity. Vickers Application Engineers will gladly discuss your individual control problems.

VICKERS Incorporated

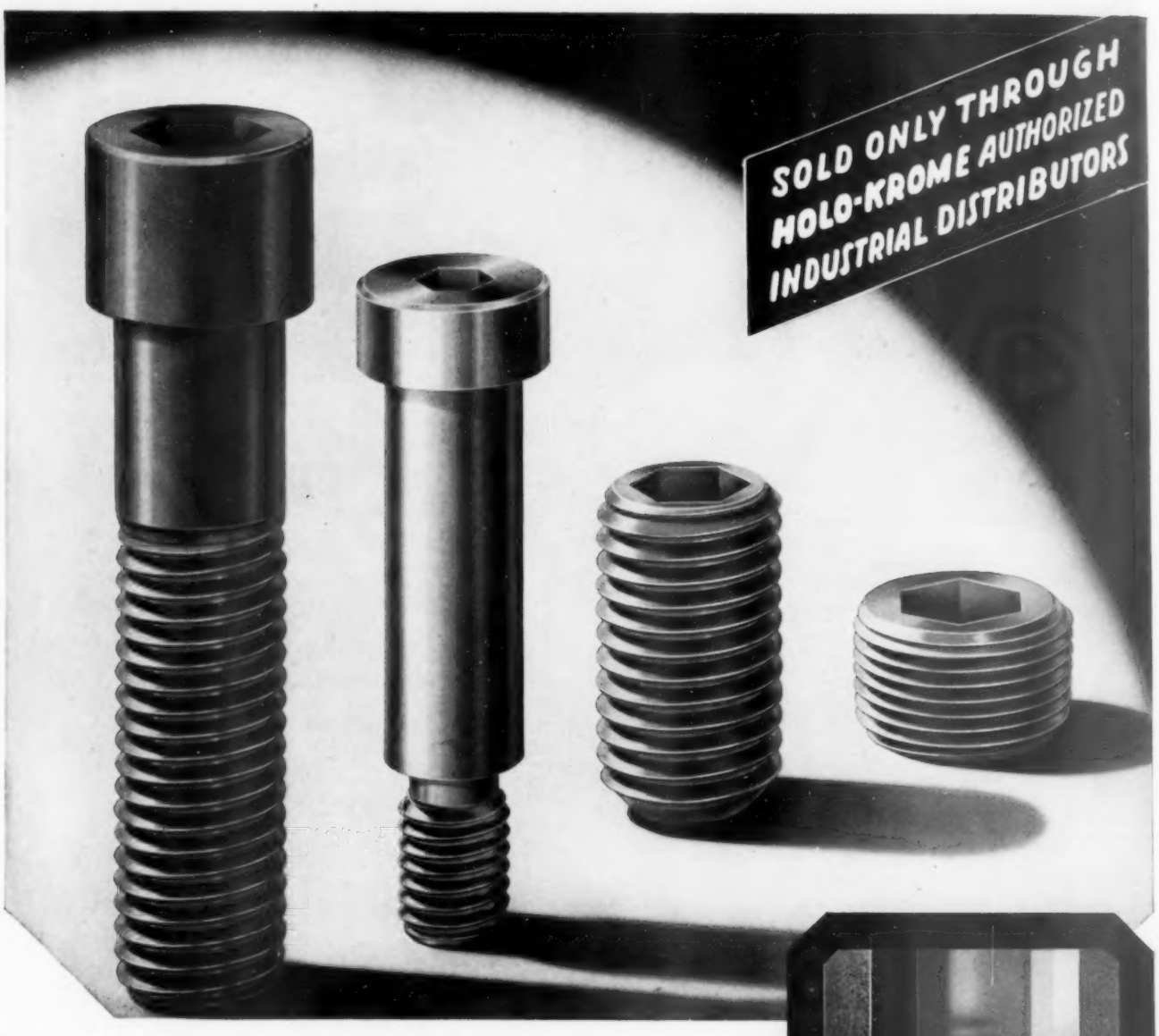
Subsidiary of the Sperry Corporation

1416 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI
CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA
ROCHESTER • ROCKFORD • SEATTLE • TULSA • WORCESTER



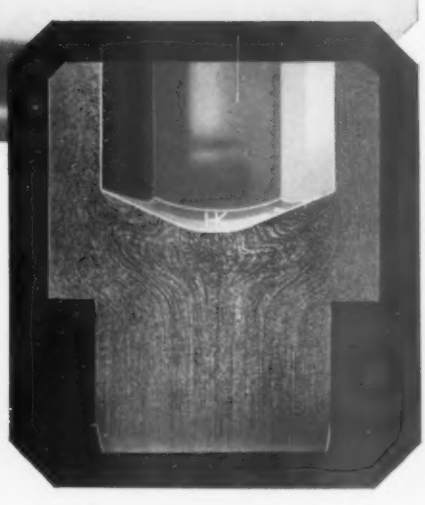
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



Completely Cold Forged QUALITY

Holo-Krome Fibro Forged Socket Screws are made by an exclusive Holo-Krome patented method whereby the Head and Body, in fact, all portions of the screw (threads excepted) are Completely Cold Forged. Fibro Forged Screws inherently have the completely continuous fibrous structure that results in increased strength. Specify "Holo-Krome" for Guaranteed Unfailing Performance.

THE HOLO-CROME SCREW CORP. HARTFORD 10, CONN. U. S. A.



The unretouched etched cutaway view of a Holo-Krome Socket Head Cap Screw . . . Notice the CONTINUOUS FIBRES.

HOLO-KROME *fibro forged* SOCKET SCREWS

Human Error ELIMINATED FROM INSPECTION AND COST MATERIALLY REDUCED!

Manual inspection of piston rings is not only tedious and costly but its effectiveness depends to a great extent on the skill of the inspector. However, unless the inspection is accurate and every ring falls within tolerance limits, either the assembly of the motor or its performance is jeopardized.

Sheffield has eliminated these obstacles by developing equipment for both users and manufacturers according to their individual needs.

Typical is the automatic gaging machine shown in Figure 1 now being used in a large automotive plant which inspects and classifies 2400 piston rings per hour on the basis of gap width (to a tolerance of .007") and ring thickness (to a tolerance of .0005"). Classifications are:

1 *rejects for oversize gap*
2 *rejects for undersize gap*
3 *rejects for oversize thickness*
4 *rejects for undersize thickness*
5 *acceptable gap and thickness*

All the operator has to do is to feed the machine and remove the inspected rings from each classification chute.

The automatic unit in Figure 2, which serves an aircraft engine manufacturer, automatically inspects both gap and periphery of piston rings and segregates them accordingly.

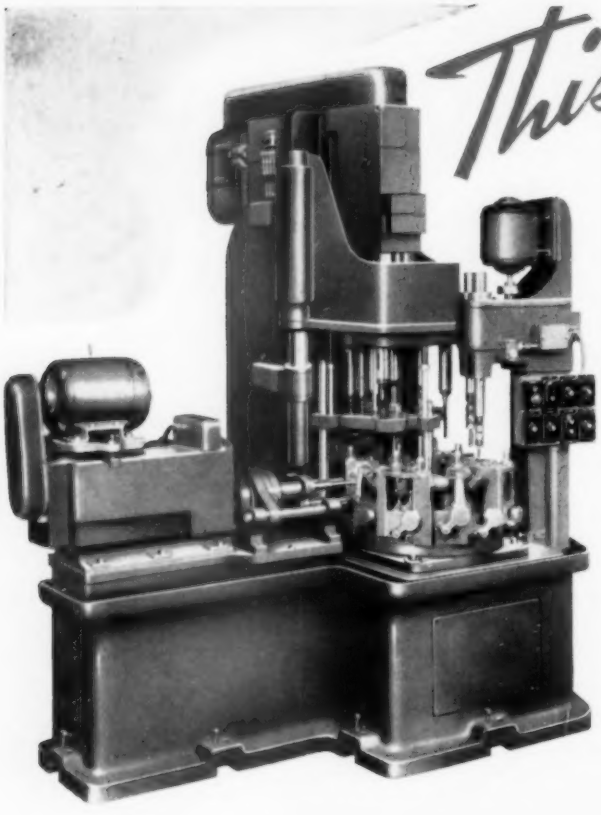
The manually loaded electronic Piston Ring Inspector (Figure 3) also checks both periphery and gap at a speed of less than 5 seconds per ring.

If you have mass inspection operations where dimensional tolerances are critical, *chek with Sheffield* on automatic equipment to reduce costs and increase the effectiveness of inspection.

the *Sheffield* corporation
Dayton 1, Ohio U.S.A.

Standard Gages Shipped in 24 Hours

Sheffield MASTER CRAFTSMEN



This "STANDARD" MACHINE DRILLS 7 HOLES— TAPS 2 HOLES— COUNTERBORES 3 HOLES *at once!*

THE *Robbins* **No. 3 Drillmatic**

Designed and built for special purpose adaptations *at lower cost*

The job shown above is a typical adaptation of the Robbins No. 3 Drillmatic. Designed and built as a standard machine expressly for special purpose adaptations, it is readily applied to a wide variety of production operations at lower initial cost. And when operations are changed, the No. 3 Drillmatic can be converted to the new job.

Work heads with any number of spindles are mounted on the tooling saddle, using the locating and hold-down holes provided. Auxiliary units, similar to the boring and tapping units in this application, may be attached to the base at any position and at any angle from vertical to horizontal.

Robbins engineers will gladly consult with you on the applications for the No. 3 Drillmatic in your plant. And with over 17 years' experience designing and building special tools and machinery, they are qualified to produce tooling for this economical machine that will do your job faster and better, *at lower initial cost.*

THE *Robbins* INDEX TABLES

Robbins Index Tables are available in sizes from 18" to 52" for hand indexing, as shown, or hydraulic power indexing as used above. Hand table is located by hardened and ground index pin which engages in bushings in table. Number and location of bushings is determined to suit application. Table indexes in one direction only . . . important safety factor. Table revolves on two ball-type bearings—one in center of table, one on outer diameter . . . effortless indexing, maximum vertical thrust support. Outer bearing has large number of balls, staggered to travel in separate arcs on hardened races . . . no brinelling.

Fully illustrated catalogs contain complete details on both these products. *Write to Robbins Engineering Company, 318 Midland Ave., Detroit 3, Michigan.*

Robbins ENGINEERING COMPANY

Producers of ROBBINS MAGNA-SINE • ROBBINS UNIV-ANGLE ROBBINS SINE PLATE • ROBBINS INDEX TABLES ROBBINS No. 3 DRILLMATIC • SPECIAL MACHINERY